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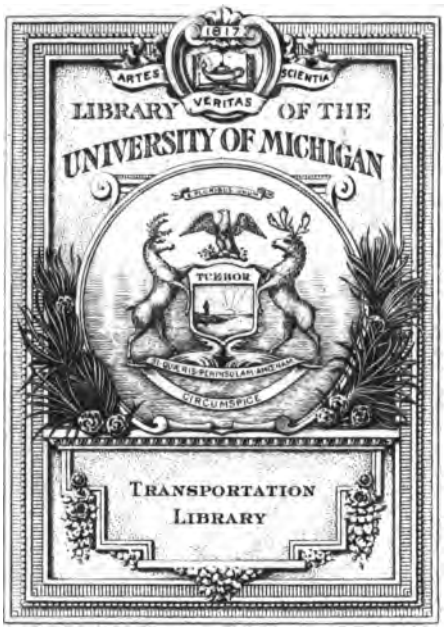

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THREE LECTURES

ON

ROADS AND ROAD MAKERS.

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I.

ROADS IN THE OLDEN TIME.—JOHN METCALF, THE FIRST ENGLISH ROAD MAKER.

Transf.

ROADS IN THE OLDEN TIME.

9-10-46 E.J.K.

Some of us have had the pleasure of travelling in an express train on the Great Western. In a cushioned seat we have read the paper, or watched the rapidly-moving panorama from the windows. Not unnaturally, our thoughts have wandered to the time when there were no roads in the country, not even a plain turnpike road; and in the midst of our reverie we have been aroused by the stoppage of the train at a station, and find that we have travelled luxuriously forty miles in not much more than as many minutes. That the roads which carry us so safely and speedily are the *result* of a high state of civilization, is an immediate and obvious conclusion; but if we reflect for a moment we shall find that a high civilization is, in a great measure, the result of good roads. Roads first; civilization afterwards. Human progress originates in the innate desire for extended information concerning other people and other lands; in proportion to the extent that this desire is gratified is the amount of that progress. History bears out the truth of this assertion. Men desirous of making the world's acquaintance, travelled first on foot, or by means

of camels and asses. But having no roads, their transit from one place to another was tedious, difficult, and dangerous. So they boated up and down the courses of rivers, and coasted along treacherous shores, subject to all the caprices of wind and weather. Yet even this limited locomotion brought advancement, intelligence, and wealth with it. In the oldest of all books, in which there is no mention of roads, we find that the national prosperity of ancient kingdoms resulted from the employment of the most primitive means of transit. Solomon carried on a profitable trade with Egypt by caravans, for the convenience of which he built the stations or cities in the wilderness mentioned in the Book of Kings. He also sent ships to Tarshish, the journey there and back occupying three years; and although the freight was anything but of a useful character—ivory, apes, and peacocks—it contributed to make his country no longer a half-civilized collection of Arab tribes, but a splendid kingdom, with a regular army, a powerful aristocracy, and a name feared and honoured by the surrounding nations. Travelling, however, was not for the million. Probably not one in a hundred thousand had ever seen the neighbouring city of Tyre; and although the Israelitish kingdom skirted the shores of the Mediterranean, the citizens of Jerusalem knew as little of the sea as a Polish peasant. They had yet to learn the lesson, that facilities for improvement spread amongst the greatest number is the true source of civilization.

The Romans seem to have been the first to undertake

vast public works that would benefit rich and poor alike. They made magnificent roads, and thus were enabled to extend their influence to the remotest regions, bringing wealth and honour to themselves, and spreading commercial prosperity throughout the barbarous countries they governed. There is nothing for which the old Roman deserves the laurel so much as in his character of road maker. He made the first roads in this island, when our ancestors painted their skins, and had Druids for their priests. How often do we think of our ancient benefactors as we walk down Watling Street, now blocked with warehouses, but once the great Roman road leading westward? or of the Old Street Road? old indeed—almost as old as that road from Rome to Puteoli, where "the brethren came" to meet St. Paul, as far as the Three Taverns, "whom, when Paul saw, he thanked God and took courage." There was a Minister of State at Rome, of high distinction, who held the office of Curator Viarum, and who was supreme director for making roads; in fact—Surveyor General. It is said of Caius Gracchus "that the people were charmed to see him go forth on his tours of road-making, followed by such numbers of architects, artificers, ambassadors, and magistrates." The Romans made their roads in a straight line, not very particular as to gradients; and, for the best of all reasons, their carriages rested on solid axles, the four wheels rigidly parallel with each other, and no springs. A curve in the road would inevitably upset a Roman conveyance. To under-

stand what kind of roads the Roman highways were, you must imagine a country road full of deep ruts and holes, and requiring very careful driving to avoid upsetting the vehicle. There was an old English term which described the operation as "quartering." Postillions carefully picked their way for many a weary mile, first on one side, and then on the other, selecting the sound parts of the road. No wonder it took a fortnight to get from London to York, when the road had to be "quartered" the whole distance. De Quincey gives a graphic description of what an old Roman road would be. "Before you, stretched a wintry length of lane, with ruts deep enough to fracture the leg of a horse, filled to the brim with stagnant pools of rain-water. Go to sleep at the beginning of a stage, and the last thing you saw—wake up, and the first thing you saw—was the line of wintry pools, the poor off horse planting his steps with care, and the cautious postillion manœuvring his way. Between the ruts formed in the roads there were narrow lines of solid earth, which the Romans called *lirœ*. The idea of these *lirœ* always conveyed the notion of swerving from right to left, and thus we get the Latin word *delirare*, and its English derivative, delirious: eternally swaying backwards and forwards until the head became dizzy and the brain was in a whirl."

The old Roman roads in England were allowed to go out of repair, and as the population increased fresh roads were made, scarcely worthy the name, being mere bridle paths, and, wherever travelled by vehicles, full of holes

and ruts. Never being "stoned," as we call it now-a-days, where the ground was soft the road gradually sunk into the ground below the level of the surrounding soil, sometimes to the depth of eight or ten feet. Such a road was Holloway, retaining the name to this day. One of the earliest laws on the subject was enacted in 1285, directing that all bushes and trees along the roads leading from one market town to another should be cut down for 200 feet on each side, to prevent robbers lurking therein. In 1346, we have the first intimation of roads being kept in repair. Edward the Third authorized the first toll to be levied for the repair of the roads leading from the village of Charing (now Charing Cross) to St. Giles in the Fields; another road from the last place to Temple Bar; and a third called Perpoole, now Gray's Inn Lane. Portpool Lane still keeps up the memory of this ancient highway. Nancy, in the Strand (the favourite heroine of the street boys in these days), would have been a buxom lass, who might have picked blackberries from the hedges while waiting for her enthusiastic lover. The footway at Temple Bar was interrupted by thickets and bushes, and in wet weather was frequently in the same condition as, I am sorry to say, it is frequently now—almost impassable. It is not far from Whitehall to Westminster; yet it is said that ere the king could reach his faithful Parliament, faggots were thrown into the ruts in King Street. The roads were so bad between London and Kensington, that people would defer their visits to one another until the

summer. We now do it any hour in the day in the omnibus for sixpence. If such were the condition of the roads near the metropolis, in the country it was still worse. In winter it was very much like travelling in a ditch. Attempts were made by the neighbouring farmers to improve the roads, by pitching big stones into the chasms, the result being here and there terrible holes, in which horse and rider were sometimes drowned.

Almost all the stone bridges in the country could have been counted on one's fingers. The Londoner of the period boasted of two—one at Stratford beyond Whitechapel, over the river Lea, an arched bridge, which gave the village the name of Stratford-le-Bow; and that most complex of structures, Old London Bridge. A grand old pile it was, finished in 1209, after taking 33 years in building. During the six centuries and a half of its existence, the amount of engineering it took to keep it together was something incredible. So narrow was the space between its twenty arches, that when the current was strong the roar of the river was heard a long way off; and shooting the bridge was so dangerous an occupation, that it gave rise to the old proverb, "London Bridge was made for wise men to go over and fools to go under." Just now, I think, the proverb might be reversed. For five hundred years our ancestors were satisfied with this solitary bridge across the Thames; for the best of all reasons, there were no roads of importance requiring connection. The watermen did nearly all the work of travel and transport. There were constantly

ferry boats plying from side to side, and from Lambeth to Wapping. So great was the extent of this river traffic, that Stowe says the Watermen's Company could at any time furnish twenty thousand men for the fleet. They were the naval reserve of those days. The Long Ferry, from London to Gravesend, carried nearly everybody who wished to enter or to leave the city. It went with the tide, and took about ten hours to accomplish the journey. One of the regulations of this ferry was, that the boatmen rendered themselves liable to a penalty if they landed the passengers more than two miles short of their destination! With but few exceptions, when people came to rivers they forded, and took guides with them who knew the safe places. This was a very useful precaution, as I have tested by my own experience. In 1852, I was travelling on horseback above Lynchburg in Virginia, on a country road, and came to a ford on the James River. I was told to go straight on in crossing until about two-thirds of the way across, when I was to turn sharp to the right. I did not turn sharp enough, and in consequence had the rather perilous pleasure of riding a swimming-horse, carried rapidly down by the current. Such were most of the fords in Old England—the names preserved in the numerous Stratfords, or street fords, which dot the map of the island.

There is a very amusing description in Mr. Kinglake's Eothen of the passage of the Jordan. By some accident they had got on the wrong side of the river, many miles from the bridge that had conveyed them safely across a

day or two before. They had vainly tried to cross in various places from its junction at the Dead Sea to many a weary mile on its course, and at last were obliged to have recourse to the assistance of a wandering tribe of Arabs who had crossed their path; and thus he relates the difficulties of the passage :—"The Arabs had brought with them a great number of skins, used for carrying water in the desert; these they filled with air, and fastened several of them to small boughs cut from the banks of the river. In this way they constructed a raft not more than four or five feet square, but rendered buoyant by the inflated skins. Upon this a portion of my baggage was placed, and was firmly tied to it by the cords used on my packsaddles. Twelve of the Arabs now stripped, and tied inflated skins to their loins. Six of the men went down into the river, got in front of the little raft, and pulled it off a few feet from the bank. The other six then dashed into the stream with loud shouts, pushing it from behind. The old men, with their long, grey, grisly beards, stood shouting and cheering, praying and commanding. At length the whirling stream seized the raft and twisted it about, bearing it rapidly downwards. The swimmers flagged, and seemed to be beaten in the struggle. But now the old men on the bank, with their right arms lifted straight, sent forth a cry and a shout that tore the wild air, and then, to make their urging yet more strong, they shrieked out the dreadful syllables, 'Brahim Pasha!' The swimmers found lungs to answer the cry, and shouting back the

name of their great destroyer, they dashed on through the torrent and bore the raft in safety to the western bank. As the raft could not be trusted for another trip, the rest of my people had to pass in a different way. Inflated skins were fastened to their loins, and thus supported they were tugged across by Arabs swimming on either side of them. The horses and mules were thrown into the water, and forced to swim over. The poor beasts had a hard struggle for their lives." It took the whole day to get the people across, and not till the next morning did the last member of the expedition reach the opposite shore. And yet at this point the width of the Jordan was not greater than that of the Thames above Kingston.

Roads were unenclosed, and to keep travellers in the right path, beacons were erected, and lighthouses, to warn them against dangerous places. There is an old ballad extant which gives a striking picture of what country lanes were in bygone days:—

In a Devonshire lane, as I trotted along
T'other day, much in want of a subject for song,
Thinks I to myself, I have hit on a strain—
Sure marriage is much like a Devonshire lane.

In the first place 'tis long, and when once you are in it
It holds you as fast as a cage does a linnet;
For howe'er rough and dirty the way may be found,
Drive forward you must—there is no turning round.

But though 'tis so long, it is not very wide,
For two are the most that together can ride;
And e'en then, 'tis a chance but they get in a pother,
And jostle and cross and run foul of each other.

Oft poverty meets them with mendicant looks,
And care pushes by them o'erladen with crooks;
And strife's grazing wheels try between them to pass,
And stubbornness blocks up the way on her ass.

Then the banks are so high to the left hand and right,
That they shut out the beauties around them from sight;
And hence you'll allow 'tis an inference plain,
That marriage is just like a Devonshire lane.

Hagbush Lane was one of the principal bridle paths leading to the North of England. It was so narrow as fairly to afford passage for no more than a single horseman, and so deep that the rider's head was beneath the level of the ground on either side. The roads in Sussex were quite a by-word. Old Fuller tells us that he once saw an old lady being driven to church in a waggon drawn by six oxen, and it required their united strength to get on then. People used to say of a bad road, that it was "a Sussex bit," and one writer tells us that "the reason that the Sussex girls had such long legs was because of the tenacity of the mud in that country; the practice of pulling the foot out of it, by the strength of the ankle, tending to stretch the muscle and lengthen the bone!"

The discovery of the printing-press has been called the source of the wonderful progress that we have made in late years. I am inclined to question it. More has been done by increased facilities of travel during the last quarter of a century than was accomplished for two hundred years after printing was invented. It may be said to have supplied the food, but not the means of digesting it. Book

learning is well nigh valueless unless accompanied by the opportunities for turning the knowledge into practical use. Speech has done more for mankind than writing. Dr. Pusey once wrote to the *Times*, stating that he had read more heterodox and other theological works than probably any other divine in the country; yet it is to be questioned whether he has done half as much towards the spiritual improvement of his generation as many an unlettered, but earnest exponent of the truth. There were plenty of erudite men in the dark ages, but they passed away leaving no mark. The bringing of men together with all their varied abilities and experience in active competition—is the true foundation of our modern advancement. Had we been all shut up from each other like monks in a cloister, we should have lapsed into barbarism long ago. Bring men together: let each throw into the general store his modicum of knowledge proceeding from individual observation and experience, and the whole community speedily becomes elevated. Lord Bacon tells us conversation makes the ready man—the man who will do something, and turn his ability to account. "Let a man have read, thought, studied, as much as he may, rarely will he reach his possible advantages as a ready man, unless he has exercised his powers much in conversation." The Chinese for centuries shut themselves in from all surrounding countries; even the various provinces spoke different languages, and were practically unknown to each other. In their history we have the best

evidence of the evil effects of banishing foreign intercourse. Their clever philosophy, their surprising knowledge in various arts and sciences, have done nothing for progress. As they were at the commencement of the Christian era, so are they now—as stationary as many of their rock-bound coasts. In our own case a travelled Englishman is no rarity. We have planted our foot on every soil, penetrated into the remotest wildernesses, and mastered all languages. The result is in the London of to-day, where science, art, and literature have their chief seat, and where too the great doctrines of Christianity find some of their best exponents. It is impossible to estimate the grandeur of the results already gained by the road reform of this century; the mind can scarcely conceive how much is likely to accrue from the facility with which we can now indulge in our national characteristics.

Bearing all this in mind, the history of our road progress becomes deeply interesting. How are we to account for the slow progress our ancestors made, compared with what has been done during the last century? Think of judges riding circuit in jackboots, and Queen Elizabeth coming to the city on a pillion behind her Lord Chancellor! Queen Bess, however, latterly provided herself with a very remarkable machine; they called it a coach, although it was nothing more than a covered cart without springs, resting solidly upon its axles. Part of the road she travelled in this singular conveyance still remains a little to the South of Morden College, Blackheath, and is appropriately called "Muddy Lane." We need not

wonder that the mother of Francis, Lord Bacon, was alarmed when she learned that her son had set up a coach. She writes in 1592:—"It was not wisdom to have it seen and known at the Court. You shall be so much pressed to lend, and your man so ready to agree, that the discommodity thereof will be as much as the commodity. I wish your health had been such as you needed not to have provided a coach but for a wife; but the will of God be done." It was related of that valiant knight Sir Henry Sydney, that on a certain day in the year 1583 he entered Shrewsbury in his waggon, "with his trompete blowynge, verey joyfull to behold and see." The first coaches for the convenience of the general public were introduced about the middle of the 17th century. They jolted along at the rate of four miles an hour, and the drivers were seldom sober, never civil, and always late. M. Sobrière, in the time of Charles II., travelled from Dover to London. "I went," he says, "in a waggon. I was drawn by six horses, one before another, and was driven by a waggoner, who walked by the side of it." "I got to London," says a Mr. Parker, in 1663, "on Saturday last; but my journey was noways pleasant, being forced to ride in the boote all the way. This travel hath so indisposed me, that I am resolved never to ride up in the coach again." People were detained days at a time on their journeys on account of the state of the roads; and no wonder,—for we read that during the Civil Wars 800 Horse were taken prisoners while sticking in the mud. Travelling by coach was a very serious and important affair.

Coaches were advertised to start, "God willing," at such an hour as shall seem good to the majority of the passengers. Old Thoresby used to go into the neighbouring fields in search of fossils while travelling between London and York. The coach put up at sundown, and "slept" on the road. The fly coach from London to Exeter slept at the latter place the fifth night from town; the next day it went to Axminster, and there a woman barber *shaved* the passengers. It was called shaving the coach. York took a week to reach, and Edinburgh a fortnight. The coach, however, was not popular. People mostly travelled on horseback. When Dr. Johnson, aged 25, wedded his charming bride of 48, they rode on horseback to Derby to get married. He describes an incident in his journey thus:—"Sir, she had read the old romances, and had got into her head the fantastical notion that a woman of spirit should use her husband like a dog. So, sir, at first she told me that I rode too fast, and she could not keep up with me; and when I rode a little slower, she passed me, and complained that I lagged behind. I was not to be made a slave of caprice, and I resolved to begin as I meant to end. I therefore pushed on briskly, until I was fairly out of sight. The road lay between two hedges, so I was sure she could not miss it, and I contrived that she should soon come up with me. When she did, I observed her to be in tears." Tears, I have heard, are very appropriate during the marriage ceremony; but hardly the thing as the result of a quarrel during a ride to the wedding.

It seems strange to say, that England two centuries ago was scarcely a commercial country, as far as interior communication was concerned; there were no means except packhorses to convey any kind of merchandise. £12 a ton was charged for conveying goods from London to Exeter. As a consequence of the almost impossible transit from one part of the kingdom to another, articles now in common use were then unknown. The pottery was of the most primitive kind, and vessels were generally made of wood—wooden spoons and plates, and leather bottles like those of ancient times. Intercourse between people at a distance from each other was confined to the narrow circle of the wealthy; and even this intercourse, limited as it must have been, was necessarily suspended during the greater part of the year. In these times originated the local dialects, local prejudices, and local customs, which survive to this day. Superstition brooded over the minds of the people. Ghosts haunted old houses in every town; and witches, with their incantations and charms, were to be found in every village. The southern counties looked upon the North of England as a foreign country. They thought it was chiefly inhabited by a half-savage race. Camden describes Lancashire as that part of the country lying beyond the mountains towards the Western Ocean. When he visited it in 1607 he acknowledged that he approached it with a kind of dread, but determined at length to run the hazard of the attempt, trusting in Divine assistance. The vicar of Cheriton, in Kent, in the year

1700, determined to travel through England. He started in the spring, his friends conveying him on the first stage of his journey, recommending him to the care of Divine Providence. He employed guides, and during his three years' travel he laid up each winter like an arctic voyager. He returned in safety after penetrating through Northumberland into Scotland, and was considered a wonderful man in his day—as great a celebrity as Livingston is now. In many places in Yorkshire and Lancashire a stranger was looked upon something in the same light as a white man in an African village. He created quite a commotion as he passed, and the word would run from door to door, "Dost knaw 'im?" "Naya." "Is 'e straunger?" "Ey for sewer." "Then paus 'im! Eave a duck at 'im! Settle 'im!" and the unfortunate intruder would be glad to escape out of the place. Macaulay says that people in some parts of Devonshire did not hear of the death of Queen Elizabeth until the courtiers had gone out of mourning. The news of Cromwell being made Protector reached Bridgewater nineteen days after the event, when the bells were set a-ringing. In the Orkneys they put up the usual prayers for James II. three months after he had landed a fugitive on the shores of France. If we endeavour to picture to ourselves the English of the period, we shall find that, having no shops in the smaller towns and villages, country people were irregularly supplied by hawkers. Pots and pans, ribbons and laces were carried from door to door. Autumn was a busy time, for then the mistress had to

provide for the winter, which she did in a style that would appear like preparing for a siege. The meat was killed and salted down at Martinmas, and baconed herrings were provided for Lent. The stock of firewood was got together, and the rushes wherewith to strew the floors. There were wheat and barley to get for the bread, malt for the ale, salt and spiceries and herbs. The well-to-do farmer then shut himself up for the winter, knowing nothing of what occurred in the outside world, and blissfully ignorant of the shortcomings of the *Times* newspaper. It did not matter much that he was unable to read, for having no glass, the windows were closed in winter, and the women sat the live long day at their distaffs and spinning wheels. One would like to know what they found to talk about; yet most probably it was a poor, miserable, petty intercourse, contributing to form that dullest of all dullards—a genuine country clown.

Scarcely any improvement took place in our roads and our means of conveyance during the greater part of the eighteenth century. Men still live who remember very primitive times—even remember when the first cart was introduced into the village. A hundred years ago no one ever thought of travelling for pleasure. In 1754 the town of Manchester advertised a flying coach, stating in their notice, "that, however incredible it may appear, this coach will actually, barring accidents, arrive in London in four days and a half after leaving Manchester." The late Lord Chancellor wrote:—"When I

first reached London (this would be about the beginning of this century) I performed the journey, from Edinburgh to London, in three nights and two days. This swift travelling was considered dangerous as well as wonderful, and I was gravely advised to stay a day in York, as several passengers who had gone through without stopping had died of apoplexy from the rapidity of the motion!" A Prussian, named Moritz, thus writes of a journey he made on the stage-coach between Northampton and London in 1782:—"The getting up alone was at the risk of one's life, and when I was up I had nothing to hold on to except the little handle at the side. The moment we set off I thought I saw certain death before me. The machine rolled with prodigious rapidity over the stones, and every moment we seemed to fly in the air, so that it appeared to me a complete miracle that we stuck to the coach at all. This continual fear of death at last became insupportable to me, and at last I carefully crept along the top of the coach, and ensconsed myself in the basket behind. On a sudden the coach proceeded at a rapid rate down a hill. Then all the boxes, iron-nailed and copper-fastened, began to dance around me, and every moment I received such violent blows that I thought my last hour had come. Shaken to pieces, bleeding, and sore, I ruefully crept back to my former position; and it rained incessantly, and as before we were covered with dust, we now were soaked with rain. My neighbour every now and then fell asleep; and when in this state he perpetually bolted

and rolled against me with the whole weight of his body, more than once nearly pushing me from my seat, to which I clung with the last strength of despair. I looked and certainly felt like a crazy fool when I arrived in London." Arthur Young stated that between Richmond and Darlington he found the roads likely to dislocate his bones, being broken in many places into deep holes, and almost impassable; "and yet," said he, "*the people will drink tea!*" And to us, living nearly a century after Young wrote, it does seem amazing that people should have been so backward in road improvement. What right, indeed, had they to drink tea, or indulge in other luxuries, while the most important of the conveniences of life was thus neglected? Road makers in those days were held in little estimation. They did nothing else except pitch stones and rubbish into the holes and ruts, not caring what size the stones were, and leaving the task of levelling to the hoofs of the horses and the wheels of the waggons.

Travelling by the packet was not a whit more comfortable. Smollett, writing in 1763, gives a very amusing account of his progress from London to Boulogne. Painfully coaching and grumbling his way through Rochester and Canterbury, fleeced by the innkeepers on the road, he reached Dover in very bad temper. His troubles had, however, scarcely begun. He sent for the master of the packet-boat—a comfortless tub called a Folkstone cutter—and hired it to carry him to Boulogne for six guineas; the man wanted eight. "We em-

barked," he says, "between six and seven o'clock in the evening, and found ourselves in a most wretched hovel. The cabin was so small that a dog could scarcely turn in it, and the beds put me in mind of holes described in some catacombs, in which the bodies of the dead were deposited, being thrust in with the feet foremost; there was no getting into them endways. We sat up all night, and at three in the morning we were told we were off Boulogne, and could not enter because the wind was blowing off shore. They then committed themselves to the ship's boat, but had not got halfway from the shore before they met a French boat, and in the midst of a heavy sea, had to shift from one small boat to another, it being the privilege of the boatmen of Boulogne to carry all passengers ashore. So we were handed into this French boat, which was half filled with water, and there waited, lying upon our oars, till the captain's boat returned to bring a packet of letters. We then rowed three leagues against wind and tide; and benumbed with cold, and the women excessively sick, we were obliged to walk from our landing place, very near a mile, to the inn, attended by six or seven bare-legged men and women carrying our baggage."

I think I have related enough to show that the men to whom we owe our present facilities of travelling are among the greatest of public benefactors. Only one hundred years ago, travelling was so difficult and hazardous a task, that rapid advancement was impossible. Just think of the advantages we possess to-day. We go

to Paris punctually in 10½ hours—just the time it took the flying mail to reach Dover from London. We travel with regularity, comfort, and speed to all parts of the country. Fast steamships cross the Atlantic in nine days. And not only by railroads and other steam communication is seen the difference between the one era and the other, but our turnpike roads, intersecting the whole country, from John o'Groat's to Land's End, are acknowledged to be the finest roads in the world. The London of to-day is the result of good roads. Cut off the metropolis from all communication outside, except by means of the outlets she possessed in 1750, and in less than a week there would be a famine, and in a fortnight a complete stagnation of trade. In those days London had to lay in a stock of salt provisions for the winter, or it would have starved. The three millions of us now congregated together never have more than a fortnight's stock on hand. Most families have no more than serves for to-day, or, at most, the morrow. How is it we never have any apprehension that the supply may fail? Think of what London eats in one day! Think of its insatiate maw, and the cry of "Give! give!" that rises amid the hum of the busy city! The freshness, the wonderful variety, and the plentifulness of our supply, we owe entirely to the magnificent system of roads, canals, and railways which connect us with the remotest corners of the kingdom. Every night a meat train leaves Aberdeen, laden with so many tons that it takes two engines to draw it. Fish trains, gathering up the spoils of the sea,

first in Scotland, and then from Tynemouth, from Whitby, from Scarborough, reach London every morning. Steam vessels arrive daily with cattle and poultry and eggs. Canal boats come laden with potatoes. Railway vans bring butter and milk; and huge market carts, piled high with vegetables, disgorge themselves every night. It is thus the great mouth is filled, and more plenty exists in this city than can be found anywhere else the wide world over. There could have been no Great Exhibitions in '51 or '62 fifty, nay, twenty years ago, for there were not anywhere the necessary communications. Think of what was done on the day of the reception of the Princess Alexandra. A triumphal entry into Gravesend, Southwark, London, Westminster, Slough, and Windsor in one day! and probably quite three millions of people were brought down to the line of route by every variety of conveyance, and from all sorts of distances. Those of us who saw that great demonstration were witnesses of the grandest popular display ever known. Not the entries of victorious armies into Rome; not the annual assemblage of two millions at Jerusalem, on the great day of the Feast; not the vast concourse of people speaking all tongues, on the plains of Dura; not any previous event in the world's history, brought so large a number of people together, as did the right loyal reception we gave to the young couple on the 7th of March, 1863. No monarch on earth ever had such a magnificent evidence of enthusiastic loyalty offered in homage to her exalted character as then had Queen

Victoria! She reigns over a country fretted with roads, and consequently is the first monarch who *could* listen to a million-voiced expression of devoted attachment.

Who then were our road makers? that we may hold their names in reverence. The men who filled up the ruts in 1760 were not much in advance of our modern stone breakers. There is an old saying that, "with blind men, the man with one eye is king." In 1765, there appeared among these contemptible road botchers, Blind Jack of Knaresborough, who took a contract for three miles of new road between Minskip and Fearnsby, near Harrogate in Yorkshire. It is a singular fact that the first extensive road maker in England who pursued it as a business was a blind man. The history of such an one cannot fail to be interesting, and I will endeavour to give it as briefly as I can.

JOHN METCALF was born in Knaresborough in 1717, the son of poor working people. At about six years of age he caught the small-pox, and became totally blind. Is there anyone of us who could possibly have commenced life with greater drawbacks? He had some advantages—a good head, a good heart, and great physical health and power. Let us watch his career. In six months after the fever had left him he was able to feel his way from the end of the street and back without a guide; at nine years old he could go on a message to any part of the town. He went bird's-nesting; was an expert climber, and mounted almost any tree with ease.

He learned to ride, and delighted above all things in a gallop. He kept a dog and coursed hares; in fact he was the wonder of the town. He learned to swim, and once saved the lives of three of his companions. He was a great diver; dived once into a deep hole, and rescued —not a man—but a bale of manufacturer's yarn. He played the fiddle beautifully, and attended professionally the assemblies at the Queen's Head and the Green Dragon at Harrogate.

As a boy, Metcalf was the personification of mischief. If the quiet of the neighbourhood was disturbed, he was sure to be at the bottom of the fun. Fruit trees were laid under contribution, Blind Jack climbing to the topmost boughs, and shaking down the fruit to his companions below. No one could trust him. Overhearing a quarrel between two men about some sheep, he determined, from pure love of fun, to scatter the flock while the owners quarrelled. He leaped over the penfold without unlocking the door, pitched the unlucky sheep over one after the other, and caused them to disperse in every direction. He then went quietly home and remained undiscovered. Another time he became offended by the conduct of a neighbouring cottier, and determined on revenge. Getting his comrades to assist him—and such was the influence of the boyish and blind captain, that they would help him in any exploit—he closed up the windows during the night with cabbage leaves, fastened with skewers, so as to prevent the inmates perceiving the return of daylight. Then he blocked up

the doorway by a mixture of stones and mud mortar, and finally poured into the cottage sufficient water from a neighbouring pump to flood the ground-floor. This was too much for the patience of his ill-used neighbour, and Metcalf was had up before the justice. Such, however, was the loyalty of the boys, and the influence he possessed over them, that he was acquitted for want of evidence.

A companion of his, being sent to an unoccupied house to fetch something, lost the key while in Metcalf's company. The blind boy set to work to get in, in order to save his friend from the inevitable flogging. He procured a long pole, placed it against the thatched roof, and climbed up the chimney. Placing a stick across the top, he fastened to it a rope, and attempted to descend by it, without success. He then threw off his clothes, and by this means managed to squeeze through the chimney, and open the door to his companion. A heavy shower coming on made the pole too slippery to return to the roof for his clothes, and he had to wait till the pole dried, before he secured them. A pretty figure he must have made with his sooty face and sodden garments.

One day, when returning to Harrogate from York, he overtook a gentleman who had lost his way. He brought the gentleman safe to his inn, the Granby, and was invited to join in a tankard of negus. On Metcalf leaving the room, "I think, landlord," said the gentleman, "that my guide must have drank a great deal of spirits since he came here." "Why so, sir?" "Well, I judge so from the appearance of his eyes." "Eyes! bless you,

sir, don't you know he is blind?" "Blind! what do you mean by that?" "I mean, sir, that he cannot see; he is as blind as a stone!" "Well, landlord, this is really too much; call him in." Enter Metcalf. "My friend, are you really blind?" "Yes, sir," said he; "I lost my sight when I was six years old." "Had I known that, I would not have ventured with you on that road from York for a hundred pounds." "And I, sir," said Metcalf, "would not have lost my way for a thousand!" Metcalf was now six feet two in height, and of great strength and robustness. He saved money, bought a horse, and taught the animal to answer his call by neighing. Marvellous stories are told of his exploits, for he was as bold a rider as ever took the field, and to follow the hounds was his greatest delight. He was not only a huntsman, but he engaged in races, and won them. On one occasion he rode his horse in a match in Knaresborough forest. The ground was a circle of a mile, to be run three times round. Great odds were laid against him; but placing men with dinner-bells at the several posts, he directed himself by their sound, and the blind man came in a winner. About this time he fell in love with Dolly, of the Granby, daughter of the landlord, or rather she fell in love with him, and they began to keep company. And a good reason she gave, when she was teased about her choice. "How could you do it?" said one of her officious feminine neighbours, who probably never had an offer. "Because I could not be happy without him,"

she replied; "his spirit is so manly and enterprising that I could not help loving him." John Metcalf was an immense favourite with the ladies. If all be true that is told of him, he, like some others of his sex, might have suited himself with a wife in a dozen eligible places. But his choice was upon Dolly, of the inn, who was said to be one of the finest women in the country. The courting had to be done warily, however, as mamma would have made short work with the lovers, had she known of it. It was John's device that he should be called Mary, and the lady by the unfeminine title of Richard. Instead of saying, "I shall call to-morrow afternoon," which everybody would have understood, John would say, "Tell Richard that Mary will see him to-morrow," and no one was the wiser but the two parties to the arrangement. The proverb of "the course of true love," &c., was not belied in Metcalf's case. Owing partly to his own conduct and partly to the opposition of the good folks at the Granby, an estrangement took place. When Metcalf returned after a lengthened absence, he found Dolly engaged to another, and the banns of marriage had been already announced. He was even engaged to fiddle at the wedding, a task which he undertook with very mingled feelings. The night before the day appointed for the ceremony Metcalf was at the Granby, disconsolate and unhappy, when he heard some words fall from the lips of his old love, which gave him hope. He was not a man to hesitate. He instantly stormed the fortress, and after some earnest talk, Dolly agreed to elope with

him that night. Early the next morning they were married by license at a distant village. When the expectant bridegroom arrived, great was the dismay of the numerous party assembled to find that the bride was missing; but the strangest thing of all to those who were in the secret was, that Blind Jack was there to do the fiddling, as though nothing had happened. Before his marriage, Metcalf became a great traveller for those days. He went on horseback to Whitby, and sailed to London. He afterwards went to Newcastle, and then to York, where he arrived in the middle of the night, and found the gates closed. Throwing his horse's bridle-rein over the spikes at the top of the gate, he climbed over, and opening it from the inside, led his horse through, and went on his way. Colonel Liddell, of Harrogate, once offered him a seat behind his carriage when returning from London to the latter place. Metcalf declined; as owing to the state of the roads, he told the colonel he could walk the two hundred miles before his carriage would reach Harrogate. This puts one in mind of the story of a man with a wooden leg being once offered a lift upon a stage-coach. "Thankee, no," said he; "I can't wait. I'm in a hurry."

After his marriage Metcalf set up as a livery-stable-keeper, but soon gave up that trade and became a fish-monger. He bought fish at the coast, and sold it at Leeds and other places. The next we hear of him, he had enlisted for a soldier! It was during the Rebellion of 1745. One Mr. Thornton came to him about a fort-

night after the battle of Prestonpans, and told him he was going to raise a company. He informed Metcalf that the French were going to join the Scotch rebels, and that if the country were to fall in their hands no man's wife, daughter, or sister, would be safe. Blind Jack was a true-born Briton. He not only enlisted himself, but started the colours of a recruiting sergeant, and in a few days raised the company and left for the wars, dressed in blue and buff, and a gold-laced hat. This extraordinary man actually performed nearly all the duties of a soldier; followed the army in all its various marchings and counter-marchings—was present in several engagements; and once was nearly captured by the enemy, who succeeded in taking prisoners nearly half of his company. His captain also was missing—supposed to have been in the rebel camp; and Metcalf undertook to turn spy, in order to open up communication with the lost officer. There is thrilling interest in the narrative of how he succeeded in penetrating the enemy's camp; was taken prisoner on suspicion, but ultimately succeeded in clearing himself before a court-martial, and returning to his regiment. Here he continued until the battle of Culloden put an end to the war. On Metcalf's return home, his young wife, who had been anxiously awaiting her fearless, reckless, blind partner, received him with open arms; and, like an old soldier, tired of war's alarms, he settled down to steady habits of business. He now became a cloth merchant; and, relinquishing that, set up as a dealer in horses. This occupation he left also, and began

a new line of business—that of common carrier between York and Knaresborough. In this speculation he saved money, and kept his now increasing family in respectability and comfort.

By this time you must have come to the opinion that John Metcalf was no ordinary man. He was blind, but he was strong of heart, and resolute of purpose. He had not been able to study books, but he had studied character; and, as he said himself, could take stock of all with whom he came in contact. His experience had been more varied than any man with two eyes among his contemporaries. They say that he could measure timber and hay in the stack, reducing their contents to feet and inches after a mental process of his own. He was a fellow of infinite wit and humour. Even in misfortune his manners and conversation were like sunshine on those whose company he kept. Being thrown from his horse, and while down receiving a severe cut on his face, "I would not have cared," said he, "so much, but to strike me while I was down!" To describe him thoroughly would take the space of a lecture in itself; enough has been said to introduce a most wonderful man, who now became celebrated as one of the greatest road makers this country has produced.

I have already alluded to his first three-miles' contract. It was the beginning only of a vast number of similar projects in which he became engaged. He had scarcely finished it, when the building of a bridge was advertised, and he put in his tender. On examination, it was found

the most favourable, and Metcalf was sent for by the trustees. They asked what he knew of a bridge. He told them that he could tell them easily, if they would put down his figures. "The span of the arch, 18 feet," said he, "being a semicircle, makes 27; the arch-stones must be a foot deep, which if multiplied by 27 will be 486; and the base will be 72 feet more. This for the arch; but it will require good backing, for which purpose there are proper stones in the old Roman wall at Aldborough, which may be used for the purpose, if you please to give directions to that effect." The trustees were so struck by his readiness, that they gave him the contract, which he completed to their entire satisfaction. I have not time to detail all the roads he made: between Harrogate and Harewood; between Mill Bridge and Halifax; between Wakefield and Doncaster; between Huddersfield and Highmore; and a score of others. In Lancashire and Yorkshire he made in large districts of country good roads, where before had only been horse tracks and mill paths. The total mileage constructed by him was one hundred and eighty miles, at the cost of sixty-four thousand pounds. Not only did he make these roads, but he surveyed many others. A personal friend wrote of him during his lifetime:—"With the assistance only of a long staff, I have several times met this man traversing the roads, ascending steep and rugged heights, exploring valleys, and investigating their several extents, forms, and situations, so as to answer his designs in the best manner. The

plans which he prepares, and the estimates which he makes, are done in a method peculiar to himself, and of which he cannot well convey the meaning to others. His abilities in this respect are, nevertheless, so great, that he finds constant employment. Most of the roads over the Peak of Derbyshire have been altered by his directions, particularly those in the vicinity of Buxton; and he is at this time constructing a new one between Wilmslow and Congleton, to open a communication with the great London Road. I have met this blind projector while engaged in making his survey. He was alone as usual, and, amongst other conversation, I made some inquiries respecting this new road. It was astonishing to hear with what accuracy he described its course."

When the high road from Huddersfield to Manchester was decided upon, he agreed to do it for so much a rood. Part of it passed over a bog nine feet deep. It was thought that there was no other way to deal with it than to dig out until a solid foundation was reached. Metcalf had his own way, however, to overcome the difficulty, and after much debate his plan was agreed to. He commenced at six different points, and employed 400 men, enjoining them all to keep his plan a secret. He surmounted the obstacle thus: He ordered heather and ling to be pulled from the adjacent ground, and after binding it in little round bundles which could be placed in the hand, these bundles were placed close together in rows in direction of the line of road; after which other similar bundles were placed transversely over them;

when all had been pressed well down, stone and gravel were led on broad-wheeled waggons, and spread on the bundles, so as to make a firm and level way. When the first load was brought on, and the horses reached the firm ground again in safety, loud cheers were set up by the bystanders. Metcalf made, in fact, a similar kind of road to that of Chat Moss, afterwards laid down by George Stephenson.

Metcalf was seventy years old when he left off road making; he was hale and hearty still, and wonderfully active. He removed to Stockport, where he lost his wife, after a union of thirty-nine years of uninterrupted happiness. He could not be idle, however, and one of his daughters having married a man in the cotton trade, he himself set up as a cotton-spinner. Not succeeding as he could wish, he returned to road making, and at the age of seventy-five completed his last road, the one from Haslingden to Accrington. Then he retired to his farm at Spofforth, and for the rest of his life was engaged in various farming operations. This strong-hearted, magnificent man lived until 1810, when in the 93rd year of his age he peacefully departed this life, leaving behind him, in addition to his roads, four children, twenty grandchildren, and ninety great grandchildren.

We can only take a brief glance at subsequent turnpike road makers. Before the death of Metcalf, at the beginning of this century, the celebrated engineer Telford entered upon the field. He made bridges by thousands and roads by hundreds of miles. He also improved the

method of "metalling," giving by his contrivances a better surface to the roads than had been known before. It is not much more than forty years ago, when MacAdam further carried out the road making improvements, which go by his name to the present day. There is, after all, much in a name. The great road maker owes his fame to the circumstance, as some one has remarked, that his name was so easily *macadamizable* into a verb. Had he been Jones or Smith, the roads would never have consented to be Jonesized or Smithized, and he would by this time have been entirely forgotten. As it is, every high-road in the kingdom bears his name, and is likely to do so, while a turnpike road remains on the surface of Great Britain.

On the threshold of this very attractive topic, I must necessarily break off. It would be impossible to pursue this subject further in the limits of an hour's lecture; but if its consideration has succeeded in awakening an interest in the history of road improvements, my object has been attained. If it be true that we owe so much to our increased facilities of intercourse, what must the value of that intercourse be which has already achieved such mighty results? With the majority of us, the greatest of all talents we possess is the power of influencing others by speech and by example. Our opportunities for exerting this influence are a hundred-fold increased by the privileges of to-day. Here then is a great responsibility. This should be no age for mere gossip. The topics for conversation are in-

finite in their variety and freshness; and the poor petty puerile small talk, dwarfing our moral and intellectual stature, should be banished from our midst. Let our hours of conversation, while they may abound with wit and with humour, with affectionate and kindly interest in all, be the hours in which our minds may receive the best education. And one thing is certain, that in proportion as we turn our conversational hours to good account, will be our own growth in all that is truly intellectual and elevating.

II.

THE CANAL MAKERS.—JAMES BRINDLEY AND THE DUKE OF BRIDGEWATER.

THE CANAL MAKERS.

About the year 1760, not much more than a hundred years ago, there stood a little thatched-roofed public-house, near Worsley Mill, on the borders of Chat Moss. At a distance of a mile and a half from the unpretending cottage, was the fine old timbered mansion, Worsley Hall, the seat of the Duke of Bridgewater. There was little else of interest in the neighbourhood. The resources of the country were undeveloped. A few strings of packhorses, laden with merchandise, and sometimes with coal from a neighbouring mine, crawled their slow length along through the slumbering villages. George, the second of the name, was king. The nation, recovering from the convulsions of the Rebellion of 1745, had not yet entered upon the struggles in Europe which ended in Waterloo. It was a remarkably uneventful period. Yet something was happening in the little village public-house, destined to have a very important effect on the history of the country. The little parlour is full of tobacco smoke. Three men sit round a table, on which is a pitcher of ale. Between the puff of their clay pipes we can see their faces. One is a young man, of age

twenty-four, very thin, wearing a wig according to the custom of the time, and looking very much out of temper. Some of the talk of the oldest man of the little party has evidently annoyed him. On the opposite side of the table sits a sturdy-looking, stout man, whiskerless, for the men of the period seem to have shaved not only their heads, but the whole of their faces. He is, apparently, in the prime of life. He puffs measuredly; while the younger man asks, querulously, "Well, what's to be done now? How are we to get at the money for finishing the canal?" BRINDLEY, for that was the name of the man addressed, after a few more long puffs, replies through the smoke, "Well, duke, I can't tell; I only know that if the money can be got, I can finish the canal, and that it will pay very well." "Ay," rejoined the young DUKE OF BRIDGEWATER, "but *where* are we to get the money?" There was another long silence, broken only by the vigorous puffs of their pipes, evincing the intensity and earnestness of their thoughts. At last Brindley started up, the smoke couldn't repress the mercury of his nature. "Don't mind, duke! Don't be cast down; we are sure to succeed after all!"

Brindley and the duke were engaged in no ordinary task. Up to that moment inland navigation in England had been confined to improving the rivers, and rendering them navigable above where the tides had influenced them. The old Egyptians made canals; one magnificent navigation had been constructed in France in the sixteenth century: it is not likely, however, that Brindley

knew anything about them. The duke had some valuable coal mines on his estate, so plentiful that at the pit mouth it could be sold at about a shilling a horse-load. Manchester was but a few miles distant, yet the cost of conveyance was enormous. The coal was carried on horses' backs or carts to the river Irwell, there shipped into boats, and when it arrived in the town had to be unshipped again and conveyed to the houses. The river charge alone was 3s. 4d. per ton. The project first entered into the mind of the duke's predecessor to connect his mines with the town by making Worsley Brook navigable to the Irwell; but it was not till some time after his death, in 1759, that a bill was carried through Parliament, for a canal between the two points. The scheme was merely on paper; accurate surveys had not been made; in fact the duke obtained a bill before he knew that he should be able to overcome the engineering difficulties of the project. The duke and his land-agent, John Gilbert, a shrewd practical man of business, set to work after the passing of the act to make a survey. They found an almost insuperable objection to their plans at the very outset. The level of the mine was far above that of the Irwell. How many locks they would have had to make had they carried out their original intentions it is impossible now to say, but they were enough to render the whole scheme impracticable. In this emergency they had recourse to James Brindley, who had already achieved a reputation for overcoming by his skill all kinds of mechanical difficulties.

If ever there was an instance of a man undertaking a work before he had counted the cost, it was the Duke of Bridgewater. An idea was in his head, and without waiting to know whether it could be accomplished, or whether he had money enough to do it if he could, he entered upon his scheme. He owed it to James Brindley that the Bridgewater Canal was not "Bridgewater's Folly."

The young duke lost his father in early life, and his mother married again and neglected him. He was sickly and ailing, and few thought that he would reach the age of manhood. But at seventeen he went abroad, accompanied by his tutor, a Mr. Wood, an accomplished scholar, and an excedingly well-informed and judicious man. He recovered his health, and gained strength of mind in the society of his companion. They stayed some time in Rome, where the duke purchased several sculptures. These were placed in packing-cases and transported to England, and were never opened until half a century after, when the duke was dead. He was a rollicking fellow at twenty—a great sporting man. He once rode a race against His Royal Highness the Duke of Cumberland (royal highnesses of those days, what did they not do?) in Trentham Park. He was the lightest of jockeys, and a bet was once made when he was engaged in a race that he would be blown off his horse before he could reach the winning post. He led a gay life; mixed in all the dissipation of the Court, and paid his court to the young and beautiful widow of the

Duke of Hamilton. Here the young butterfly of fashion burnt his wings. He became deeply enamoured, and subsequently an accepted lover. The manners of the Court were very loose. Lady Coventry, the sister of his intended bride, having caused considerable scandal by her conduct, the duke requested that there should be no further intercourse with her. The high-spirited young dowager resented the interference, and the match was broken off. He quitted the society of women altogether after this untoward circumstance, went moodily down to his estate at Worsley, and in a few years we find him in the smoky parlour of that little public-house near Worsley Mill.

An ash tree in the middle of a little croft near Buxton marks the spot where Brindley was born in 1716. He commenced to work as soon as arms and legs were strong enough, and being the son of a poor man, and the eldest of a large family, he received no education. The mechanical bent of his mind showed itself at a very early period. Whenever he could he would get into a neighbouring mill, and watch the wheels and other parts of the machinery for hours together. The little fellow managed to obtain possession of a knife—his own knife. What a charm there is about a boy's first knife! To a youngster with mechanical tastes it is the leading event of his life. The large oval Cromwellian silver watch with which the boy first manifests an extraordinary interest in the flight of time, hardly causes more excitement than the bladed knife that at length satisfies his

propensity for whittling. Brindley's knife should be seen with Watt's engine and Stephenson's locomotive at the Kensington Museum, for it presaged the part he was to play in the engineering revolutions of the age. With it, and all the little bits of wood he could get together, he made models of wheels, put them into communication with each other on the mill principle, and then made miniature streams of water and set them to work. Certainly the boy had a taste in a useful direction. His mother, who was a sensible woman, encouraged him; and eventually, at the age of seventeen, he was bound apprentice for seven years, to Abraham Bennett, a millwright, at Sutton, near Macclesfield. Millwrights were then the only engineers in the country. Whether it was a windmill or a pump, a machine for making paper or for winding silk, the millwright was the only one who could be consulted. The new apprentice, strangely enough, turned out to be very stupid and slow. The men were a rough, drunken set, and Brindley's chief duty was continually running for beer. The custom of making the younger apprentice a kind of potboy has not yet died out. Thanks to the total abstinence movement, a great change has taken place in our workshops. I have heard John Cassell, the now celebrated publisher, say that for a long time he had just this kind of employment in a carpenter's shop in the north of England. Brindley, the "bungler," and the "spoiler of wood," as he was called, was undaunted. He blundered his way into excellence. Sometimes when the men were absent in

the public-house a job would be required to be done on the instant, and many was the tool that he blunted, and plenty of timber did he spoil, in doing his best to supply the want. One time he was required to fit the spokes of a wheel during their absence; but when the thing was done, poor Brindley had fitted them all the wrong way. He made such a mess of some work that was given to him, that at last his master threatened to cancel his indentures if he did not amend.

It must be remembered that all these early difficulties were caused by the dislike of the men to give the lad any instruction. He had to find everything out for himself. He was eminently self-taught. His invincible spirit and natural aptitude soon overcame all obstacles, and he learned at the very outset of life to overcome mechanical difficulties by dint of perseverance and cudgelling his own brain. Before he had completed the third year of his apprenticeship, Brindley became the most accomplished millwright in the shop. His master's customers preferred him to any of the other workmen in the execution of repairs. He put his conscience also into his work. It was always thoroughly and substantially done, so much so that his employer, Bennett, expostulated with him. "Jem," said he, "if thou persist in this foolish way of working, there will be very little trade left to be done when thou comes out o' thy time: thou knaws firmness o' wark's th' ruin o' trade." There are plenty of Bennetts now in all trades, who, whatever may be their pretensions in relation to morality or religion, are exceedingly un-

principled in the matter of boots, or other of their manufactures. The Americans have invented a term for this kind of work—"shoddy." The 'cute Yankee, of nutmeg notoriety, understands it well, but no man ever made a reputation worth having by "shoddy."

By the time Brindley had half completed the term of his apprenticeship he was put in charge of the shop; and when his master died he carried on the business, until he removed to Leek to commence on his own account. Employment was plentiful; for the conscientious manner in which he executed his orders gained him numerous customers. When he repaired machinery, by introducing improvements he made it better than new, and was never known to exceed the stipulated time in the performance. He carried out his improvements on almost everything he touched, and was consulted whenever any new machinery was required. If it were to drain a mine, or smelt iron or copper, Brindley was the man, and he became known throughout the district as the "schemer." Brindley, the schemer, kept a memorandum book. He had learned to write during his apprenticeship in a rough kind of way. His spelling, as we say of some people's education, was neglected. The ladies may take encouragement, for no one ever spelt worse than James Brindley. You must study a page of his note-book before you can find out what the hieroglyphics mean. Lord Gower figures as an "Arle," and is supplied with "Loog of Daal 20 foot long," the said "loog" being required for a "mow (new) invonshon." We find from

these memoranda, that during the early part of his career, Brindley received two shillings a day wages, and sixpence a day for his travelling expenses. In the potteries district he erected flint mills, for the celebrated Wedgwood and others. He drained the mines of Clifton, for Mr. Heathcote. At Congleton he erected a silk mill, introducing changes into the machinery, by means of which, as much work, and of a far better description, could be cut in a day as had before occupied at least a fortnight.

His most wonderful achievement was the construction of a wooden steam-engine. An infinite trouble it was to this indomitable inventor. It should not be forgotten that Brindley worked long before Watt, and at least half a century before the engineers of whom George Stephenson was the chief. According to the entries in his pocket-book, he seems to have done nearly the whole work himself. There is a charge for "falling big tree, three and a half days." It takes him, says Mr. Smiles, to whom we are indebted for the knowledge of Brindley's memorandums, "five days to get the 'great leavor fixed,' thirty-nine days to put the boiler together, and thirteen days to get the pit prepared." It took him a whole year to complete it, and he set it a-going in November, 1757. Now his troubles commence; the fault of the wooden steam-engine was that it wouldn't keep going. It puts me in mind of the engines of an American steamer I once had the misfortune to travel by. It had beautiful engines, but you couldn't depend on them. Every now

and then they wanted easing or oiling, or screwing up. When we left our berths in the morning, the first question was, "How's the engine?" The pocket-book tells tales, for we find, turning over the leaves, "Bad louk five days," then "midlin louk" and "bad louk," and "midlin louk" again, until at last, when his patience was almost exhausted, he writes, under date 19th of March, in the following year, "Engon at woork three days." Such unwonted success seems to have cheered him amazingly, for he triumphantly adds, "driv a heyd." In one sense, however, the poor wooden thing continued to be a "donkey" engine, for it wouldn't go, to the dismay and trouble of its projector, who had the honesty to put down, after one of its numerous break downs, "to run about drinking, one shilling and sixpence." Brindley was not to be beaten yet. Finding that his present plan would not succeed, he sets to work on another invention, and in December, 1758, James Brindley, of Leek, in the county of Stafford, millwright, lodges a specification in the Patent Office, for a steam engine with entirely new arrangements.

Such is the previous history of the middle-aged man smoking in the parlour of the country inn with the Duke of Bridgewater and his land-agent, John Gilbert.

When recourse was had to Brindley in the construction of the canal from Worsley to Manchester, he immediately commenced what he calls in his note-book, an "ochilor servey, or a ricconitoring." The result was

a proposition to carry the canal over the Irwell on a bridge, in order to maintain as near as possible a level road all the way. To us, who are familiar with all kinds of engineering wonders, this proposal of Brindley's does not seem anything extraordinary. But we must not forget that in 1759 such a work was unheard of. The incredulous laughed the project to scorn, and the bridge designed was known as "Brindley's castle in the air." When it was rumoured that the duke intended to proceed with the undertaking, his friends came about him, and entreated him not to throw away his money on so great a folly. They said, "Whoever heard of such a thing?" —a poor, flimsy argument, not yet out of date when any one leaves the beaten track. Poor Brindley was fain to get the opinion of an eminent engineer, in order to strengthen the determination of the duke. "Counsel's opinion" said in the most unqualified manner that the idea was absurd and impossible; and the said "counsel" "had often heard of castles in the air, but never before saw where any of them were to be erected!" It was greatly to the credit of the Duke of Bridgewater that he chose to listen to Brindley, instead of attending to the universal prognostication of failure. The work was commenced.

Let us for a moment glance at what had to be done. A water-tight trunk had to be constructed, and carried over embankments and viaducts, and through cuttings and tunnels, so as to secure a level way. It is easy enough now to make such a canal, but Brindley had to

contrive everything. He had to make accurate surveys, to be the architect of his own bridge, and to invent the hundred and one arrangements necessary for the various cuttings and embankments. Last of all, he had to make his way water-tight. Has it ever suggested itself, how it is that canals do not leak? Were you to make a trench in your garden, and fill it with water, you know that it would ooze through in a very short time. Yet the continuous earth embankments, stretching their long arms through the country, do contain the water, while the neighbouring land may be parched with drought. Brindley had to find out how to do that. He learned the art while embanking some of the small streams in his neighbourhood. The process is called "puddling." "What do you mean by *puddle?*" asked one of the committee of the House of Commons, before whom Brindley was examined. This is how Brindley explained to the committee. He sent for a mass of clay, laid it on the table before him, and the M.P.'s drew up their chairs, and watched his proceedings. He pommels the mass until he makes it into a trough; then, filling it with water, points out the fact of its speedy absorption into the clay. "Now," said he, "I will puddle it." He mixes the clay with water thoroughly (what does he care for dirty hands?), shapes the mass again into a trough, pours in the water, and, strange to say, this singular vessel is water-tight, and lies on the table for the rest of the sitting, not a drop of the water escaping. The bottoms of Brindley's canals, and all subsequent ones, are ren-

dered water-tight by "puddle" formed of a mixture of sand and well-tempered clay in a half-fluid state.

The committee were equally dubious on the subject of the aqueduct. "How do you intend to construct it?" they asked; "and where are your plans?" Brindley's plans were in his head; but he went out and presently returned with a large Cheshire cheese. With the aid of his knife he produced a model, and explained his designs entirely to the satisfaction of his hearers.

Brindley was as successful with his aqueduct as with "puddling," and he succeeded in solving the difficulty of "the castle in the air" over the river Irwell. It was a bridge of three arches, nearly forty feet above the river, allowing the largest barges to pass without lowering their masts; was built entirely of stone blocks; and with its "puddled" channel, is in as good a state to-day as when it was first erected.

The canal was opened in 1761. The next we hear of Brindley he was "ricconitoring" for the extension of it to Runcorn on the Mersey, so as to connect with the port of Liverpool. During his labours on the Bridgewater Canal, it must not be supposed that he was unemployed in other directions. A letter in the *St. James's Chronicle*, of 1763, says: "Many gentlemen are reaping the advantage of Mr. Brindley's inventions, he having taught them a method of draining coal pits by a fire engine constructed at the expense of £150, which no one before knew how to make at less than £500. In these he uses wooden chains, which are preferable to iron

ones, and cylinders made of deal." He was employed in every direction, and made a survey for Earl Gower, for a canal to connect Bristol and Hull with Manchester and the Mersey. It would seem that the Bridgewater work was as much for love as for money. I have already mentioned that he received from the duke only two shillings and sixpence a day; on other work he would receive a guinea a day, and thus was enabled to invest a sum of nearly £500 in a mining speculation long before the duke's canal was completed. Even the small salary he charged to the account of the canal was never paid after the year 1765. For seven years he received nothing. It is painful to note the inconceivable meanness of the Duke of Bridgewater, who, when in receipt of £80,000 a year as the result of the success of Brindley's engineering works, allowed his widow to solicit in vain for a settlement of overdue salary. The duke's agent paid £100 on account; the balance remains due to this day. It is in process of payment, however, in a manner not anticipated. Posterity, before it gives credit to the duke for his many good qualities and the services he rendered to his country, debits against him this mean act to Brindley, and makes him pay for it out of his reputation.

Brindley's whole soul was in the success of the undertaking. If he charged the duke less than he did, he would have charged nothing. His note-book tells us that some days his expenses were twopence for the turnpike; another time sixpence was charged for "ating and

drink," and so on. When Brindley went to London to be examined by the Committee of the House, in reference to the second part of the canal, his whole expenses for the first eight days' sojourn, and the five days occupied in travelling, as charged to the duke, was four pounds eight shillings, including board, lodging, wages, and travelling. As soon as he arrived he spent out of his own pocket a week's wages for a new pair of breeches, and two weeks' pay for a coat and waistcoat, in order that he might make a decent appearance. His expenses for the first eight days are all contained on one side of his note-book. We find, in addition to the above, that a pair of new boots cost him six shillings, and to clean them sixpence. He paid a shilling for shaving four times (a very expensive process then), and expended no less than nine shillings in a visit to the play. It was his first visit and his last. He saw Garrick as Richard III., and he became so excited and unsettled in mind that he did not get over it for a week. He declared that no consideration should induce him to enter a theatre again. He seems to have cooled off by attending church on the following Sunday. *It* did not make him ill.

During nine weeks' stay in London, Brindley was continually at work removing the obstacles thrown in the way by opponents to the bill. In 1762, the chief opposition came from a son of the then Lord Derby, who mustered the Tory party to defeat the duke's project. It is a singular coincidence, that a grandson of the Lord Derby of Brindley's time, the present Conservative leader,

headed the opposition to the railways as his ancestor did to the canals. The noble earl rides express when he comes to London. He told Stephenson once that if he could produce an engine to run twenty miles an hour he would *eat it!*

The bill passed, and the note-book records, under the date February 26th, 1762:—

"Ad a grate division of 127 for te duk
98 nos

for te duk 29 me jorete."

Brindley returned in triumph to Worsley, and set about the new part of the canal. It was twenty-eight miles long, with its locks, and bridges, and embankments. The industrious engineer constructed the canal in a sense not understood in later days. He first settled the claims and compensation for the land, bought all the wood and stone and material required, measured the quantities, paid all the workmen, designed the bridges and erected them, built the canal boats used in the conveyance of material—in fact, he was everything; he made the bricks, surveyed the land, and was mason, carpenter, paymaster, engineer, and boat-builder. In five years it was completed, and the whole extent of the Bridgewater Canal opened for traffic. The duke found the money £220,000, Brindley the constructive genius to overcome the engineering difficulties. Although, as we have seen, the profits were very unequally divided, it was a partnership. The nobleman and the engineer were on such

equal terms, that Brindley always maintained a very independent bearing towards the duke. They often disputed, and sometimes nearly quarrelled. They were both obstinate men, but Brindley was the most *convinced* man; he knew his business best, and the duke would meet him at breakfast, after one of their differences, and would frankly say, "Well, Brindley, I have been thinking over what we were talking over last night. I find you may be right after all; do it your own way."

After ten years of hard work in his enterprise, the Duke of Bridgewater became thoroughly absorbed in his pursuit. His mind occupied itself in little else but coals and canals. He constantly travelled on his own canal boats, would remain for hours on the coal-wharfs, watching the carters and the people who purchased small quantities of coals. One day, when standing in the coal-yard, a man who had just got his sack filled turned to the duke, not knowing who the plainly-dressed man was. "Heigh, master," said he, "coom, gie me a lift wi' this sack o' coal on to my shou'der?" Without any hesitation the duke gave the required lift. Some one near went up to the man—"Dun ye knaw who's that yo've been speaking tull?" "Naw; who is he?" "Why, it's the duke hissen!" "The duke!" exclaimed the man, throwing down his sack; "what will he do at me? Maun a goo ax his pardon!" But the duke had disappeared.

The duke rarely visited London, but spent the whole

of his time in his congenial occupation at Worsley. He was a careful business man. No tradesman looked more thoroughly into the details of his undertakings than did this scion of a noble race. He watched the labours of his men with all the vigilance of an overseer. To such a length did he carry this supervision, that Brindley once expostulated with him, for the men did not like to break off work for dinner while the duke was looking on, and for that reason it was found difficult to get hands. The duke took care after that to leave by the accustomed dinner hour; but he remarked that the men quitted work the moment the clock struck twelve, and were not at all particular in returning at one. The excuse was that the men did not always hear the clock strike the solitary hour. From that time, by special order of the duke, the clock at Worsley was made to strike *thirteen* at one o'clock, and this practice continues at the Worsley mines to this day. There is a road used by the miners, called "Half-crown Row," so called, because when it was first made, the duke fined the men half-a-crown who did not appear punctually at work on the Monday morning.

As the duke advanced in age he became corpulent. We may picture him in a coat and deep waistcoat of brown cloth, with frill in front, drab breeches, and periwig with ribboned tail. He smoked continuously, and carried snuff loose in his waistcoat pocket, occasionally dipping all his fingers into it, and thrusting enough into his nose at one pinch to set a whole company sneezing. He

had a curious habit, when at home, of running out with his pipe in his mouth every few minutes to tap the barometer. He was careless in his dress, and rough in his manner. He thee'd and thou'd the people he met with in the same way as his miners did. He seldom read anything, and hardly ever wrote unless he was compelled. Taking a dislike to the sex, he would not even allow a woman servant to wait upon him. At his country seat he cultivated none of the graces. He disliked flowers and such like rubbish, and when he returned once from one of his few short visits to London, finding some newly-planted flowers, he mercilessly struck off their heads with his cane.

I must confess to the feeling that there is not much to admire in the character of the Duke of Bridgewater. Mr. Smiles thinks highly of him as an employer—calls him a "pattern one," and in proof of it, cites the fact that he built his workpeople comfortable dwellings, bound them to contribute to a sick fund, discountenanced the public-houses, and established Sunday schools for their education. All this is very praiseworthy, and we can also admit that once in his life he was munificent, when he contributed £100,000 to the loyalty fund, demanded by the exigencies of the then government. But we cannot get over his meanness to Brindley, and are inclined to suspect that the motive which actuated his efforts for the improvement of the miners was a selfish one. We do not hear that he took a particle of interest in any one unless he had a pecuniary interest in so doing. My lord

the duke had the soul of a tradesman; and in point of character was not one whit above the man who spends the whole life that God has given to him absorbed in the shop. In thus accusing the duke of selfishness, I must be careful, for who amongst us is without sin? In a recent paper, by R. W. Emerson, on "Life without Principle," he writes that while inveighing against the selfishness of the age, he was startled by overhearing one of his audience say to another, "I wonder what he gets for it?" "I trembled in my shoes," said he; and well he might, for hadn't he received a fee of five guineas for the talk!

Before Brindley had completed the duke's canals, he was engaged in the construction of a much greater undertaking. The Grand Trunk Canal was intended to unite the rivers which flowed past the great towns of Bristol, Hull, and Liverpool. Birmingham, Lichfield, Derby, Stafford, Manchester, and the potteries' district were by this means connected with the great eastern and western ports of the island. The canal was more than a hundred and thirty-nine miles in extent. It was considered at the time a work of stupendous magnitude, and indeed was the greatest engineering work undertaken in England up to that period. It contained no less than seventy-five locks; an aqueduct of twenty-three arches crossed the river Dove, four more spanned the river Trent, and there were altogether about one hundred and sixty minor aqueducts over the rivers and roads, and one hundred and nine road bridges over the

canal. The most novel feature in the new undertaking was, however, its five tunnels. To avoid the delay of the locks, Brindley proposed to bore through the hills in order to obtain a level. Like the suggestion to carry the canal over a river, the idea of running it through the bowels of the earth was visited with unsparing ridicule. It was on the 30th of December, 1765, at a meeting held at Wolseley Bridge, in Staffordshire, that Brindley explained his plans. Earl Gower, the lord-lieutenant, presided; and three or four members of Parliament, with Josiah Wedgwood, and others, listened to the arguments of the unlettered engineer. The result was, that his scheme was adopted—locks, aqueducts, tunnels and all—Wedgwood munificently subscribing £1,000 towards the preliminary expenses. There was the usual opposition to meet and surmount in the passage of the bill through Parliament, the very same arguments being used against the canals as were subsequently advanced against the railways: the country would be ruined, the breed of horses would be destroyed, the innkeepers would be bankrupt, and poor old England sink into the position of a second-rate European power. Great was the rejoicing of the potteries' district when the bill passed.

Burslem, where the Chancellor of the Exchequer laid the foundation-stone of the Wedgwood Institute, in 1863, seems to have been the head-quarters of the canal enterprise. Not one of the least of the great actions of the lame, pock-marked, but truly great man, Wedgwood,

the potter, was cutting the first sod of the Grand Trunk Canal, on the 26th of July, 1766. I doubt whether the brilliant audience and the still more brilliant speech of Mr. Gladstone, nearly a century after, equalled in any degree the scene on the declivity of the Bramhills, when Wedgwood put spade into the sod, and wheeled away the first barrowful of the earth on the line of the projected canal. The people, at any rate, thoroughly appreciated the work; they declared a general holiday, roasted a sheep whole, and there was no end of demonstrations in honour of the event.

Brindley soon became immersed in his work, commencing at once with the main operation, the tunnel at Harecastle. The public curiosity was greatly excited in the labours of the underground engineer. They came for miles round to watch the progress of the works. A letter written from Burslem, in 1767, says:—"Gentlemen come to view our eighth wonder of the world, the subterranean navigation, which is cutting by the great Mr. Brindley, who handles rocks as easily as you would plum-pies, and makes the four elements subservient to his rule. He is as plain a looking man as one of the boors of the Peake, or one of his own carters; but when he speaks, all can listen, and every mind is filled with wonder at the things he pronounces to be practicable."

Brindley had by this time become celebrated, and justly so. He was unquestionably the first engineer of his time. In pursuing the study of Brindley, I have been surprised that he has been so little appreciated, if

not almost forgotten. The advent of the railway system, marvellous as indeed it has been, seems for the time to have cast the labours of the earlier engineers into the shade. We forget that the art of making a level road with its cuttings, embankments, bridges, viaducts, and tunnels, was well nigh brought to perfection by James Brindley. What Stephenson did was to make a practicable engine and practicable rails; in the rest of his work, those wonderful monuments of engineering skill, he was anticipated by the great canal maker. I am not familiar with the country through which the Grand Trunk Canal passes, but I am told that they astonish the traveller of the present day. "You never know where you will meet the canal next," said a gentleman to me; "now it is at your feet, further on it runs over your head, and anon it is lost in a tunnel, to be seen again climbing along the sides of the hills." If such an impression is now created when travelling in the country that Brindley so courageously handled, we need not be surprised at the startling effect these works had upon the minds of the people in the middle of the eighteenth century. One writer, who describes the operations to a friend, says, writing in 1769, "I cannot leave this subject without mentioning Mr. Brindley once more, who, great in himself, harbours no contracted notions, no jealousy of rivals. He conceals not his method of proceeding, nor asks patents to secure the whole use of the machines which he invents and exposes to public view. * * * His powers shine the most in the midst of difficulties; when rivers and

mountains seem to thwart his designs, then appears his vast capacity, by which he makes them obedient to his will."

However we may have neglected the memory of the canal maker, we have evidence that his contemporaries rendered the homage that was his due. Poets even sung the praises of the canal enterprise, as the following quotation will show :—

> "Here smooth canals across extended plain
> Stretch their long arms to join the distant main.
> The traveller with pleasing wonder sees
> The white sail gleaming through the dusky trees,
> And views the altered landscape with surprise,
> And doubts the magic scenes that round him rise.
> Now like a flock of swans around his head,
> Their woven wings, the flying vessels spread ;
> Now meeting streams in artful mazes glide,
> While each, unmingled, pours a separate tide ;
> Now through the hidden veins of earth they flow,
> And visit sulphurous mines and caves below.
> The ductile streams obey the guiding hand,
> And social plenty circles round the land."

The almost immediate results of the canal enterprise on the towns and villages through which the Grand Trunk Canal passed were marvellous. Although the canal was only opened by sections at a time, an impetus was given to manufacturing and commercial enterprise which speedily changed the whole face of the country. Manchester had only a population of twenty thousand when Brindley commenced his public works. It had a communication with London every other day, the mail

coach taking four and a half days in the journey. Not a man in the town kept a carriage. Dr. Aiken states that the Manchester man of 1750 "used to be in his warehouse before six in the morning, accompanied by his children and apprentices. At seven they all came in to breakfast, which consisted of one large dish of water pottage, made of oatmeal, water, and a little salt, boiled thick, and poured into a dish. At the side was a pan or basin of milk, and the master and apprentices, each with a wooden spoon in his hand, without loss of time dipped his hand into the same dish, and thence into the milk-pan, and as soon as it was finished they all returned to their work." The Manchester manufacturer that we are acquainted with, who lives in his mansion and park out of town, and employs thousands of hands in the smoky city of half a million of inhabitants, is a somewhat different man in his habits and manners to his great grandfather. What could the great grandfathers do? Into the ill-paved streets of their town they received little except by means of packhorses. Coals, salt, cotton, fruit, potatoes, and vegetables, all came in panniers, doled out to them, as it were, in handfuls. Manchester, like the rest of the towns, was, through the want of roads, exactly in the condition of a beleaguered city, especially in winter. At the very time Brindley commenced the Bridgewater Canal there was a dearth of provisions in Manchester from this cause. The people blamed the millers and the corn-dealers, accusing them of monopoly; not understanding the lesson their descend-

ants had slowly and painfully to learn, that monopoly dies if facility be given to trade, by making first a path for it and then removing all restrictions. It was the misfortune, not the fault, of the two principal millers to be very spare and lean. A popular lampoon ran thus :—

"Bone and Skin, two millers thin,
Would starve the town or near it ;
But be it known to Skin and Bone
That flesh and blood won't bear it."

The popular clamour was succeeded by riot and bloodshed, and the Shude Hill Fight, as it was called, occupies a conspicuous place in the annals of the town of Manchester. The principal men of the town had a club; how much it was like the Reform Club, or the United Service, may be seen when it is stated that the expenses of each person at their ordinary meetings were fixed at fourpence-halfpenny—fourpence for ale, and a halfpenny for tobacco. A fashionable assembly met once a week, the charge for which was half-a-crown a quarter. Their maids went with lanterns and pattens to conduct the ladies home. "Nor," says Dr. Aiken, "was it unusual for their partners also to attend them." I suppose the pattens were those instruments I remember to have seen, which had a circular piece of iron fastened at a distance of two or three inches from the wooden sole. It was always a matter of surprise how the women managed to walk in them; and I must confess that, uncomfortable as it is to walk beside a lady with large crinoline on a wet night, I see still less to desire in the company of a lady with pattens.

It makes one impatient to read of the instances of neglect to make good roads and means of communication, characteristic of our forefathers. Some kind of road the Manchester people must have had, or the coach could not have left for London; but the little estimation in which it was held, may be seen from the fact that a highway-rate levied, or "laid," as they used to call it in the four townships which now constitute the most populous parts of modern Manchester, amounted in the year to the aggregate sum of £6 18s. 10d. Six pounds eighteen shillings and tenpence for the roads! What Brindley did for Manchester may be estimated, when it is stated that in ten years from the commencement of the Grand Trunk Navigation the population doubled; and it went on doubling itself every twenty-five years, until in 1861 it possessed a population of 460,000.

If a reliable testimony be needed to the deplorable condition of the potteries when Brindley and Wedgwood first put their heads together on the canal enterprise, John Wesley gives it in describing his first visit there. The people were coarse, bull-baiting, cock-fighting brutes, who jeered at his preaching, and disturbed it by throwing clods at his head. Arthur Young had so poor an opinion of them, that he states, "I apprehend the rates were burdened for the spreading of laziness, drunkenness, tea drinking, and debauchery." Young had a singular prejudice against tea, as will be remembered in my last lecture; in our day we can hardly conceive of a man getting debauched on tea! A part of

the district was called by the appropriate name of Lie Waste; sometimes it was Mud City. Hutton writes, that the houses were scattered, made of clay, hardened by the sun, having the appearance of caves. The males were half naked, and the children covered with rags. "You might as well look for the moon in a coal-pit," he says, "as for stays or white linen in the city of mud." It was in this unpromising country that the first sod of the canal was broken. A change was about to come over that dismal scene of wretchedness, ignorance, and debauchery. The agents in this work were probably little aware of the future results of their labour. Wedgwood planted his manufactories, Brindley watered the district with his canals, and Wesley coming to a prepared people found a soil where the great evangelical truths of our religion found a deep root. It is very natural, in looking at a beautiful flower, to feel intense pleasure in the thought that a beneficent Father made it. How much more delightful is it, when contemplating the moral and physical beauty which succeeded the degradation of the potteries' district, to feel that we owe the result to the same great cause; and that Wesley, and Wedgwood, and Brindley were alike agents of an overruling Providence.

Long before any part of the Grand Trunk was opened, Brindley was occupied in constructing many other canals; Coventry, Birmingham, Droitwich, Oxford, and Cheltenham, successively were supplied with connecting links. Brindley's industry was prodigious, and he had a constitution like iron. Few men could have stood the wear

and tear of his labours. He was continually exposed to all kinds of weather, and his brain was never idle for a moment. Not even the toothache daunted him. "Brindley's cure" was a singular one. "If it spites me I will spite it," said he, and he would wash his mouth alternately with water intensely cold or boiling hot, until he roared with pain. In his government of himself, his conduct was at once odd, simple, and heroic. Having a magnificent digestion, he could easily eat more than was good for him, without feeling uncomfortable. He was a cosy-looking man, in excellent condition, as might be noted by his rotundity. After one of his morning's herculean work, he did not measure as much round the waist as when he rose at daybreak. There was a certain button on his waistcoat plain enough then to be seen, which sunk in and disappeared to view as the exercise told upon him. Well, sitting down to dinner he would eat and drink until the said button made its reappearance, when nothing would induce him to take another morsel.

This thorough command of himself enabled him to accomplish wonders. Not only did he undertake the construction of the various canals we have already mentioned, amounting to nearly four hundred miles, with all their bridges, locks, and tunnels, but he planned out or was consulted about numerous others. In this way he became identified with canals from London to Reading, from Leeds to Liverpool, and from the Clyde to the Firth of Forth. It is very surprising that the whole of his canal labours were crowded into a space of

twelve years, for Brindley lived but twelve years after the passing of the act for the construction of the Bridgewater Canal. It was long enough, however, to set the whole country in a ferment about inland navigation. The first lines paid a handsome dividend; and capital, so difficult to obtain when the project was only in Brindley's brain, was easily obtained for the new canal schemes. Before the close of the century between two and three thousand miles were in operation, and no part of the country was distant more than fifteen miles from navigable water. Inland navigation did so much to enrich the kingdom that the Pitts were enabled to support the enormous wars, which not only taxed the people to the utmost, but left us with our enormous National Debt. The road regeneration added constantly to the national wealth, enabling an old writer to say, about the year 1797 (he must have been an auctioneer), "This happy isle, where the foot of the foe never treads, if it were brought to the hammer would sell for more than it would have fetched at any former period."

Brindley was also consulted by the Corporation of London in reference to the improvement of the Thames navigation. He was, indeed, the apostle of inland navigation. He lived in it mind and body. As he surveyed the landscape, he saw nothing except the advantages or the difficulties it presented to navigation. "What do you consider to be the use of navigable rivers?" asked a member of the House of Commons. "To make canals, to be sure," was Brindley's instant

reply. And yet he was not entirely occupied with this branch of engineering, for we have already detailed some of his efforts in other directions, and towards the latter part of his life we find that he was consulted about draining the Lincolnshire Fens, building a sea wall, and cleaning the Docks at Liverpool.

Vast as the extent of his public works were, no record has reached us of how he accomplished them. His note-books simply contain rough memorandums of engagements and expenses. Many of his erections were completed without any recourse to plans. He worked everything out in his head, and such was his surprising memory that he rarely made a mistake. If the works were unusually difficult, he would lie in bed for three days at a time, racking his brain until the whole scheme was developed. Long practice in this mental engineering made him a rare proficient. He could remember all the complex parts of the most intricate machinery, and execute his designs trusting to his memory alone. In his calculations he was an accomplished mental arithmetician; he worked the question for some time in his head, and then put down a few figures. The same process he would repeat until he solved the problem he wished to elucidate; but it would have been impossible for him to explain to another the process by which he arrived at his conclusions. He was a man pre-eminently

"Of mother wit,
And wise without the schools."

He read of nothing and thought of nothing but his

engineering tasks. For years he lived at inns and country public-houses, only occasionally visiting the houses of friends. His friendships were formed entirely amongst his business connections. At a place called New Chapel he frequently stayed at the house of Mr. Henshall, who assisted him in his surveys. The busy bachelor of forty-six took a liking to one of Henshall's daughters, a school girl, and displayed his partiality by loading his pockets with gingerbread for her especial benefit. After a long course of gingerbread and courtship, Brindley persuaded the young lady to marry him, and at the mature age of fifty he took his young bride of nineteen home to his mansion of Turnhurst, a large house he had recently purchased. Their short wedded life was as happy as could be expected. Mrs. Brindley entered thoroughly into her husband's engagements, performed the duties of a secretary, and thus rendered the pocket-book almost unnecessary. There is a summer-house on the grounds of Turnhurst still shown as the place where Brindley prepared his plans, assisted by his young wife. Two daughters were born to them, one of whom married and settled in Australia, the district in which she lived retaining the name of Brindley's Plains to this day.

A few fields from his house was the colliery of Golden Hill, in which Brindley was a principal proprietor. He brought all his genius to work to connect its coal pits, by tunnelled canals, with the inland system of navigation constructing under his direction. He was in the midst of these improvements, busy with all kinds of new pro-

jects, the Grand Trunk Canal and other works still unfinished, when he became seriously ill. Whilst surveying a canal near Ipstone he was drenched with rain, but continued his work the rest of the day. A damp bed at the inn the same night completed the mischief done to his already overworked constitution, and he returned home to Turnhurst to die. Not even his painful illness, however, could damp the ardour of his mind. He was full of his projects to the very last. He thought of nothing but the multitude of works in which his guiding hand was no longer to be felt. Within a few hours of his death, some canal contractors arrived at his house. They had met with a serious difficulty in the construction of their canal. They could not get their channel to hold the water. Admitted to the bedside of the sick man, they explained their failure, and wished to know how to remedy it. "Puddle it!" replied Brindley. "But we have already done so," returned the contractors. "Then puddle again—and again." The dying engineer had strength to say no more. On the 27th of September, 1772, the great self-taught canal constructor died, in the fifty-sixth year of his age. He was buried at New Chapel, a simple stone slab surrounded by an iron railing marking his last resting place.

In estimating Brindley's character, too much cannot be said in admiration of the wonderful power he displayed in mastering difficulties, in spite of his educational disadvantages. He was an illiterate man, who wrote, read, and ciphered with difficulty. By dint of cudgelling

his brain, he managed not only to supply his deficiency, but to excel every one of his contemporaries. To the want of education, however, must be ascribed the shortening of his life. He knew nothing of the diversities of art and science. The current literature of the day was closed to him. He was happy only in the society of those who could talk about canals, and nothing else. Consequently, for his singularly active mind there was no relaxation. It was all work, and no play; and thus in the very height of his fame, before he could finish his undertakings, and realize the reward he so richly merited, he was prematurely cut off out of the land of the living.

Justice has not been done to James Brindley. Of all the men who have contributed to the surprising advances of civilization, characteristic of the last century, Brindley stands the foremost. Rennie, Telford, Brunel, Stephenson, have been appreciated by their contemporaries—some of them lie in honoured graves in Westminster Abbey. Yet the man who sleeps peacefully in the little burying-ground in the north of England has doubtless superior claims to them all. He first, by means of vast engineering skill, developed the internal resources of this country; and there is not a man in this generation who does not owe something to the memory of the illustrious engineer, JAMES BRINDLEY!

III.

THE STORY OF THE RAILWAYS.

THE STORY OF THE RAILWAYS.

We have seen how rapidly, at the end of the last century, the country became covered with good turnpike roads and navigable canals. We can scarcely realize how comparatively modern these improvements are. It was a primitive world in which our great grandfathers lived. They were the last link of long generations very slow of advancement, giving place to a race destined to see modern civilization proceed at a meteor's pace.

Wonderful is the history of the railroad development of the last forty years. Inventive men long puzzled their brains to solve the problem of a steam-carriage and a road upon which it might travel. Before the first French Revolution, Cugnot invented a locomotive. It was the most primitive of all engines. In appearance it was like a brewer's dray, with a copper where the horse ought to be, containing the steam, which acted upon pistons attached to the two fore wheels. It could only run fifteen minutes at a time, when the copper had to be replenished. It was very difficult to stop it when it was once

set a-going; and when weighted with four passengers, it could only travel two and a half miles in an hour. Cugnot improved his first engine, and started the second on the streets of Paris; but turning a corner near where the Madeleine now stands, the whole apparatus came to grief, and is now to be seen among the curiosities of the museum of Paris. In 1787, one Oliver Evans obtained from the state of Maryland an exclusive right to make and to use steam-carriages; but his privilege was worthless, for nothing that he could make was at all practicable. In 1786, William Murdoch made a steam locomotive one foot in height. It ran upon three wheels, the boiler being heated by a spirit lamp. Poor fellow, he had a world of trouble with the little thing. One night he determined to set it going, and chose an unfrequented walk leading to the church, about a mile from the town of Redruth in Cornwall. It was very dark, and the only light was that from the fiery little monster, which spurted and blew, and dashed along with a speed that left its inventor far behind. Just leaving the church, and coming along the green hedged path came the parson, leisurely, when with a dash, bang, scream, and a whizz, the little steam-imp met him, and the worthy man, utterly unable to comprehend the mystery, took to his heels, and in a well-contested race came in the winner.

It never suggested itself to the first inventors to wed their steam-carriages to a railroad. Hornblower, the contemporary of the celebrated Watt, says: "Railways have been in use in this kingdom time out of mind." They

were generally made of scantlings of oak, and there is a legend that the name of the first man who employed them was Outram, and hence the origin of *tram*-roads. Many a decade of years did horses draw their loads along the tramroads leading from the mines, before iron was employed. The invention of the old iron rail is not due to science, but to an economical idea of one of the managers of the Coalbrookdale Iron Works. Somewhere between the middle and the close of the last century, the supply exceeded the demand at Coalbrookdale. Pigs, to use the market expression, were flat, and lay piled up in heaps without purchasers. Then came the ingenious suggestion that if the pigs were laid along the wooden rails, and temporarily fastened to them, at any rate they would save the wear and tear of the wood, and when prices rose, could be easily taken up again and sold to the iron merchants. This is the origin of the first iron railroad.

In 1792, there was a tall young man, of remarkable personal appearance, born and bred among the tramroads about the Cornish mines. His father was purser of the mines of the district, and he had just heard that his thoughtful son, of height six feet two, and of a mechanical bent, had been appointed to the responsible and superior position of general mining engineer. So great was the father's surprise that he considered it his duty to expostulate with the proprietors for their rashness in making such an appointment. But there was more stuff in Richard Trevithic than the father gave him credit for.

Not content with keeping everything in order, he revolved in his mind a scheme which in 1802 was developed into the first practicable high-pressure steam-engine.

The story of the railroads cannot be told without the history of Richard Trevithic. The catalogue of the Industrial Museum at South Kensington states of him: "Inventor and constructor of the first high-pressure steam-engine, and the first steam-carriage used in England; constructor of a tunnel beneath the Thames, which he completed to within a hundred feet of the proposed terminus, and was then compelled to abandon the undertaking; inventor and constructor of steam-engines and machinery for the mines of Peru (capable of being transported in mountainous districts), by which he succeeded in restoring the Peruvian mines to prosperity; also of coining machinery for the Peruvian mint, and of furnaces for purifying silver ore by fusion; also inventor of other improvements in steam-engines, impelling carriage, hydraulic engines, propelling and towing vessels, discharging and storing ships' cargoes, floating docks, construction of vessels, iron buoys, steam boilers, cooking, obtaining fresh water, heating apartments, &c."

A captain of the mines named Vivian found the money, and Trevithic the brains, for the first steam-engine. It was a bold experiment. All the old engineers, including the celebrated Watt, were afraid of the high-pressure principle. This compressed steam was a dangerous thing to meddle with. The new engine excited little public attention in the remote district of Cornwall, near the

Land's End, where it was first started. Thoroughly unmanageable were the first road steam-engines. When steam was up in Trevithic's engine, it tore like mad along the road to Plymouth, smashing every impediment that was in its way, and, occasionally swerving to right or left, making havoc among the railings and gardens of gentlemen, who owed the engine no grudge, but who were intensely alarmed at its unceremonious conduct. Coleridge describes an incident in the first journey of the Cornish engine.

"As Trevithic and Vivian were steaming along the road, the latter caught sight of a closed toll-bar, just as they had torn down the front rails of a gentleman's garden. Vivian called to his partner to slacken speed, which he did, and came dead up to the gate, which was opened like lightning by the toll-keeper. 'What have us got to pay?' asked the ungrammatical Vivian. 'Na, na, na, na!' stammered the poor man, trembling in every limb, with his teeth chattering as if he had the ague. 'What have us got to pay, I ask?' 'Na—noth—nothing to pay. Pray, my de—ar Mr. Deevil, do drive on as fast as ever you can. Nothing to pay!'"

After many curious exploits this engine was shipped to London, and in the summer of 1803 it was exhibited in a field near the Euston Road, not far from the present station of the North Western Railway. It previously made a tour along Oxford Street. The streets were crowded with people, who waved their handkerchiefs, and cheered lustily as the steam monster came

careering along. And well they might, although they little dreamed, at that time, of the countless locomotives that would have to acknowledge in the novel machine the "mother of them all." Two years ago there was an old lady living near Edgware Road, a Mrs. Humblestone, eighty-one years of age, who remembered distinctly the public trial of Trevithic's steam-carriage.

Trevithic had a very singular temper. For some reason or other he removed his engine the day after its first exhibition in London, and returned to Cornwall, where, in the year following, he constructed a second engine for travelling on the railroads. This engine at its first trial drew carriages containing ten tons of bar iron for a distance of nine miles at the rate of five miles an hour. Having thus solved the problem of locomotive travelling, Trevithic seems to have thought little more about it, and entered upon other schemes. A man named Rees Jones, who worked at the engine, states, "She was used for bringing down metal from the furnaces to the old forge. She worked very well; but frequently, from her weight, broke the tram-plates and the hooks between the trams. After working for some time in this way, she took a load of iron from Pen-y-darran down the Basin Road, upon which road she was intended to work. On her journey she broke a great many of the tram-plates, and before reaching the basin she ran off the road, and was brought back to Pen-y-darran by horses." Thus ends the history of the first railroad locomotive.

In 1811, Mr. Blenkinsop, of Leeds, invented an engine with cogged wheels, running on cogged rails. His railroad was about three and a half miles long, and for many years, while it was in operation, was one of the principal curiosities of the neighbourhood. In 1816, the Emperor Nicholas of Russia, then grand duke, visited it and witnessed the engine dragging as many as thirty coal waggons at a speed of three miles and a quarter per hour.

In 1813, Mr. Brunton, of the Butterley Works, Derbyshire, patented a new engine *to go upon legs!* The legs were to go in front of the engine alternately, like those of a horse, and the steam power was to be assisted by a *horizontal windmill.* It was a grand conception, but on its very first start the boiler burst, and killed and wounded nearly everybody that was about it.

In 1812, one Tommy Waters, under the auspices of Mr. Blackett, made a locomotive. It is described as a "strange machine, with lots of pumps, cog-wheels, and plugs," and weighed about six tons. It was first tried on the Wylam tramway, which passed the house where George Stephenson was born. It was placed on a wooden frame with wheels, and a barrel of water, also on wheels, was fastened to it as a tender. But the machine wouldn't move an inch. So Tommy Waters mounted the engine, seized hold of the safety-valve, and in a rage declared that "either *she* or *he* should go." *She* went, for Jonathan Foster says quaintly, "She flew all to pieces, and it was the biggest wonder in the world we were not all blewn up."

And now Jonathan tried his hand. His engine proved more successful, for it could drag eight or nine loaded waggons a mile an hour. It broke the road constantly on account of its weight, but performed its journey of five miles, when it didn't stop, in six hours comfortably. It was also apt to get off the rack rail, and then it came to a dead stop. The driver was one day asked how he got on. "Get on!" said he, "we don't get on; we only get off!"

But Mr. Blackett, of the Wylam Works, was not to be discouraged. He and Jonathan Foster went to work on another engine, this time dispensing with the cogged rails. The great fault of it was the noise that it made. In modern engines the steam escapes into the chimney, forming what is called the steam blast. The Wylam engine blew off into the air at high pressure with tremendous uproar, causing considerable annoyance to horses passing along. So intolerable did the nuisance become, that steps were taken by the neighbouring gentry to put it down. Orders were then given to the engine-driver that whenever any horse, or vehicle drawn by horses, came in sight, he was to stop his engine until the horses were out of sight. This noisy engine of Mr. Blackett, appropriately called "Puffing Billy," with some improvements, worked on the Wylam tramway for nearly half a century, and is now deposited in the Museum at South Kensington.

Such were the engines in use when the engineer at Killingworth, George Stephenson, was, in 1813, supplied

with money by Lord Ravensworth, and commenced to make his engine. It was finished, and placed on the railway at Killingworth, on the 25th of July, 1814, and succeeded in drawing eight loaded carriages of thirty tons weight at the rate of four miles an hour. This engine was familiarly styled "The Blutcher," for what reason I cannot say. The word is not in the dictionary; but it no doubt had something to do with the fact that the engine had no springs, and that its progress was a series of jolts not pleasant to its driver or conducive to its preservation. I have not ridden in a steam-carriage without springs—a waggon without those necessary articles of comfort is bad enough—but I remember once making a journey in a train where the carriages had no buffers. It was a curious sensation when the train arrived at a station. Before the carriages became still, they bumped up against each other with a series of crashes, commencing with a jerk which made you cling to your seat, and ending almost imperceptibly after running down a scale of successive concussions. I suppose that is what they call "blutching."

Stephenson's engine was a very little improvement, if any, on those of his neighbours. In fact, it was found that it did not pay, being much more expensive than horses; and it was only when Stephenson applied to it the steam blast—that is, letting the escaped steam into the chimney, and thus causing a powerful blast to the furnace, a practice which had been observed in Trevithic's engine, but had, for some reason or other, been discon-

tinued—that the scale was turned, and the engine became an economical success.

About this time Stephenson was visited by Mr. William James, the first man in England, probably, who conceived the idea of passenger lines of railway. As early as 1802, this very extraordinary but little-known man traversed the North of England and surveyed lines for railway purposes. Among his schemes, at this time, was a railway between London and Chatham, being the first hint of our most modern railway enterprise, the London, Chatham, and Dover Railway. He visited all the steam locomotives as they appeared, went to Cornwall and inspected Trevithic's, and then Blenkinsop's, Blackett's, and the others in succession, and at last came to Killingworth, while Stephenson was yet an enginewright, and had a long conference with him. At this time James was a very wealthy projector. He described his views to Stephenson of the feasibility of railway traffic, expressed his conviction that the locomotive could be improved so as to run at a much greater speed, and gave the enginewright many practical suggestions.

After Stephenson went into partnership with Lock, a wealthy ironmaster in the neighbourhood, he produced some further improvements in the locomotive. Little was done, however, to increase its speed, until the great battle of the railways had been fought, and the "Rocket" gained the prize of £500 in 1829. Many men followed in the footsteps of James, and strenuously advocated the construction of railroads. They were not at all decided

as to whether the carriages should be drawn by steam-engines or by horses. The engines were of immense weight, and cut up the primitive rails fearfully, and for this reason Stephenson suggested and carried out many improvements in rails and road-making; but the progress was slow and tedious, and carrying heavy weights at one mile per hour seemed to be the utmost that could be gained.

In 1817, Edward Pease, a member of the Society of Friends, who died as recently as 1858, projected the Stockton and Darlington Railway. In 1818, a bill was brought before Parliament and thrown out; it was brought forward again in 1819 and 1820, but not until the following year did the bill pass for the "making and maintaining of a railway or tramroad, for the passage of waggons and other carriages." It was stipulated in the first railway bill that the public should be free to use the line as a high road with horses, cattle, and carriages, between five in the morning and ten in the evening. It was to be conducted on the canal principle.

In the latter part of the year 1821, two men knocked at the door of the house of Mr. Pease, with the message that somebody from Killingworth wanted to speak to him. They introduced themselves as George Stephenson and his friend Nicholas Wood. They had heard of the railway, and Stephenson had come to offer his services to survey the line, and to propose that locomotives should be used. Mr. Pease was doubtful, but said Stephenson, "Come over to Killingworth, and see what my engines can

do; seeing is believing, sir." The confident engineer succeeded in enlisting the sympathies of the projector, and returned home. His day's work was something astounding. His companion tells us they first rode thirty-six miles from Killingworth, then walked twenty miles through the fields, made their call at Darlington, and when they left Mr. Pease they walked eighteen miles back to Durham. A few days after, a messenger on horseback appeared at Killingworth, with a letter for George Stephenson, Esquire, engineer, but no one knew of such an one, and the man was about returning unsuccessful, when the idea suggested itself to one of the colliers that the man meant "Geordie;" and so to Geordie's cottage he was sent, and delivered his message. The letter requested the Killingworth enginewright to make a preliminary survey. This was done, and in 1823, in obedience to his directions, an amended Act was passed through Parliament, in which powers were given to work the railroad by means of steam locomotives. Stephenson was now appointed the company's engineer at a salary of £300 a year. He was naturally often at Mr. Pease's house, talking over the progress of the undertaking, and frequently was in the society of the worthy Quaker's two daughters. An incident described by Mr. Smiles, was made a subject of one of the most popular pictures in a recent Academy Exhibition. "Finding the young ladies learning the art of embroidery, he volunteered to instruct them. 'I know all about it,' said he, 'and you will wonder how I learnt it. I

will tell you. When I was a brakesman at Killingworth, I learnt the art of embroidery while working the pitmen's buttonholes by the engine fire at night.'"

One of the results of talking with Mr. Pease was the establishment, in 1824, of the firm of Stephenson and Co., who opened an engine manufactory in Forth Street, Newcastle, destined to become one of the largest of the mammoth factories of modern times.

The Stockton and Darlington line was opened on the 27th September, 1825. An immense concourse of people assembled to witness the opening of the first public railway. A long train started at the foot of the incline, preceded by a man on horseback, carrying a flag. At this period it was supposed that any horse could outrun an engine. Then came Stephenson on one of his own engines, dragging six waggons loaded with corn and flour; a passenger coach filled with directors and their friends; twenty-one waggons fitted up with temporary seats for passengers, and six waggon-loads of coal; making in all, thirty-eight vehicles. One of the local papers stated with great gravity on the following morning: "The signal being given, the engine started off with this immense train of carriages; and such was its velocity, that in some parts the speed was frequently twelve miles an hour."

As soon as the line was in working order the coal business was done by the locomotives, but the passenger traffic was managed with horses. The first railway coach was of a shape similar to those vehicles where fat

women are shown at fairs; a row of wooden seats ran along each side of the interior, with a deal table fixed in the centre, and it was entered in a similar manner to an omnibus. These coaches were drawn by one horse, and were kept up by coaching companies in Stockton. A Mr. Clephan thus describes the railway passenger traffic of 1825: "There were two separate coach companies in Stockton, and amusing collisions sometimes occurred between the drivers, who found the rail a novel element of contention. Coaches cannot pass each other on the rail as on the road; and as the line was single, with four sidings in the mile, when two coaches met, or two trains, or coach and train, the question arose, which of the drivers must go back? This was not always settled in silence. As to trains, it came to be a sort of understanding that light waggons should give way to loaded; and as to trains and coaches, that the passengers should have the preference over coals; while coaches, when they met, should quarrel it out. At length, midway between sidings, a post was erected, and a rule was laid down that he who had passed the pillar must go on, and the 'coming man' go back." The railway followed the course of the turnpike road for some distance. It is stated that one day a race came off between No. 1 engine, and one of the stage-coaches travelling along the ordinary road, when after prodigious puffing and blowing on the part of the engine it beat the coach and horses by about a hundred yards!

The real battle of the Railways was not, however,

fought on the Stockton and Darlington. In 1820, Mr. Thomas Gray, of Nottingham, published a book, "Observations on a General Iron Railway," in which he urged the propriety of making a railway between Manchester and Liverpool. The history of the Manchester and Liverpool Railway is the history of the early struggles and success of the railway enterprise. Gray canvassed his project with wondrous zeal. He memorialized, and petitioned, and deputationed all kinds of influential men until Gray and his "general iron railway" became known as a bore and his hobby. William Howitt, who knew him personally, says that this pertinacious projector seized all men by the buttonhole and unravelled his scheme of a general iron railway. "Begin where you would, on whatever subject—the weather, the news, the political movement or event of the day—it would not be many minutes before you would be enveloped in steam, and listening to an harangue on the practicability and immense advantages to the nation and every man in it of 'a general iron railway.'"

Edward Pease and Joseph Sandars, of Liverpool, took up the project of the Liverpool and Manchester Railway, and William James, after twenty years of consistent advocacy of railways, was appointed surveyor. George Stephenson sent his son Robert to assist in the survey. It was no joke to survey for the new railway. The opposition was intense. Farmers stationed their men with pitchforks and guns to drive off the intruders. They had in some places almost as many stand-up fights as

observations. And then there was the grand difficulty of Chat Moss. James was a thickset, heavy man, and he and his theodolite were too much for the treacherous bog. Robert Stephenson relates that on one occasion the luckless surveyor found himself suddenly sinking, and he had to throw himself down flat and roll over and over before he reached a firmer ground. "In a sad mess," says the narrator.

In the midst of the work William James was seized with illness, and when he recovered he was lodged in prison for debt. The enterprise then languished, until in 1824, George Stephenson was engaged, and the survey proceeded. But the difficulties continued. The principal opposition came from the people on the Duke of Bridgewater's estate. Mr. Bradshaw refused his sanction altogether and stationed guards all round his property. One moonlight night, however, Stephenson's party adopted the following ruse. Some men were ordered off to a distant corner of the estate and fired off guns in succession. Away went the gamekeepers and the other men in that direction, while the surveying party succeeded in making a rapid survey in their absence. George Stephenson said, "I was threatened to be ducked in the pond if I proceeded, and of course we had a great deal of the survey to take by stealth, at the time when the people were at dinner. We could not get it done by night; indeed we were watched day and night, and guns were discharged over the grounds to prevent us."

At last the survey was completed, and in the session

of Parliament of 1825, the bill was brought before it. And now came the fiercest opposition. It is really amusing to read thirty or forty years after this period the singular ideas that prevailed on the subject. The friends of the new railway almost universally advised that little should be said about the locomotive or its speed, if they wished the bill to pass. Mr. William Brougham, the brother of Henry Brougham, was engaged by the promoters to conduct the case; and when Stephenson talked about going twenty miles an hour, he strongly advised him to moderate his views, and bring his engine within *reasonable* speed. "If you do not," said he, "you will inevitably damn the whole concern, and be yourself regarded as a maniac only fit for Bedlam."

Sir John Barrow, then of the Admiralty, a friend to the new measure, told the promoters that they ought to be satisfied with simply proving the necessity of the new line, and by no means to hint even at the intention to carry passengers. He suggested that *passengers* and *speed* should be kept entirely out of the act; but if anything was said about the latter, that it should not be at a greater rate than five miles an hour. Listen to what he says: "My objection to great speed being attended with great danger applies only to the conveyance of passengers, and not to vehicles appended to the extremity of a long stream of waggons; in which, however, I still think you will not get many who will suffer themselves to be conveyed even at the rate of eight miles an hour, amidst the hissing noise and the dense smoke of their own and

other passing engines. I think it would be wise for the present, at least, to give up the passengers, for it is *there* you will fail, if you persevere. You will at once raise a host of enemies in the proprietors of coaches, postchaises, innkeepers, &c., whose interests will be attacked, and who, I have no doubt, will be strongly supported, and for what? Some thousands of passengers, *you* say—but a few hundreds *I* should say—in the year."

Stephenson states that at this time he could not get a single civil engineer to countenance his project of locomotive passenger traffic. The great *Quarterly Review* ridiculed the idea of travelling at a greater rate than eight or nine miles an hour, and thought that people should be satisfied with getting from Liverpool to Manchester in the day. In reference to a projected Woolwich line, it said, "What can be more palpably absurd and ridiculous than the prospect held out of locomotives travelling *twice as fast* as stage-coaches? We trust that Parliament will, in all railways it may sanction, limit the speed to eight or nine miles an hour, which we entirely agree with Mr. Sylvester, is as great as can be ventured on with safety."

On the 21st of March, 1825, the Liverpool and Manchester Bill went into Committee. A great array of leading counsel assembled to oppose it at every stage of the proceedings. Day after day was passed in the attempt to prove that there was a necessity for the new line. It was not till the 25th of the following month

that they began to get to real business in a three days' examination of George Stephenson. He stated his opinion that the locomotive could be used safely, that in the language of Mr. Adam, who made the opening speech on behalf of the company, "none of the tremendous consequences have ensued from the use of steam in land carriages that have been stated. The horses have not started, nor the cows ceased to give their milk, nor have ladies miscarried at the sight of these things going forward at the rate of five miles an hour." In his strong Northumberland dialect, Stephenson stated his belief that his engines could travel twelve miles an hour, but he should only recommend eight miles an hour with twenty tons, and four miles an hour with forty tons. Mr. Alderson, afterwards the judge of that name, subjected the engineer to very severe cross-examination, ridiculing the idea of the speed of twelve miles an hour. That rate of speed appeared to be so fatal to the success of the measure, that the promoters were afraid it should be imagined that they intended to adopt it, and re-called Stephenson to the witness-box to depose that twelve miles an hour was not contemplated. One of the committee asked Stephenson, "Suppose, now, one of these engines to be going along a railroad at the rate of nine or ten miles an hour, and that a cow were to stray on the line and get in the way of the engine, would not that, think you, be a very awkward circumstance?" "Yes," was the answer of the witness, with a twinkle in his eye—"*for the coo!*" The late Sir William Cubitt,

the architect, was called upon to show that if the survey was not exactly correct, it could be made so; for Stephenson's surveys were never very perfect, and the wily lawyers had soon discovered that there lay the weak point of the railway promoters.

When the case for the company was completed, Mr. Harrison rose to oppose the measure. "Who, but Mr. Stephenson," said he, "would have thought of entering into Chat Moss, and carrying it out almost like wet dung? It is ignorance almost inconceivable. It is perfect madness, in a person called upon to speak on a scientific subject, to propose such a plan." And then alluding to the locomotives—"When we set out with the original prospectus, we were to gallop, I know not at what rate; I believe it was at the rate of twelve miles an hour. My learned friend Mr. Adam contemplated—possibly alluding to Ireland—that some of the Irish members would arrive in the waggons to a division. My learned friend says that they would go at the rate of twelve miles an hour with the aid of the devil in the form of the locomotive, sitting as postillion on the fore horse, and one honourable member sitting behind him to stir up the fire, and keep it at full speed. But the speed at which these locomotive engines are to go has slackened. Mr. Adam does not go faster now than five miles an hour. The learned sergeant (Spankie) says he should like to have seven, but he would be content to go six. I will show he cannot go six; and probably, for any practical purposes, I may be able to show that I can keep

up with him *by the canal.* Locomotive engines are liable to be operated upon by the weather. You are told that they are affected by rain, and an attempt has been made to cover them; but the wind will affect them; and any gale of wind that would affect the traffic on the Mersey would render it *impossible* to set off a locomotive engine, either by poking of the fire, or keeping up the pressure of the steam till the boiler was ready to burst."

Distinguished engineers were examined to prove that the contemplated line was utterly impracticable. Numerous petitioners brought up their witnesses to show that it would become an intolerable nuisance; and Mr. Alderson summed up the whole case in opposition, by a speech which extended over two days. He treated the project of crossing Chat Moss with the bitterest sarcasm, closing his remarks on that subject by the following utterances:—"Every one knows Chat Moss. I have heard of culverts which have been put upon the Moss, which, after having been surveyed the day before, have the next morning disappeared; and that a house (a poet's house, who may be supposed to be in the habit of building castles in the air), story after story, as fast as one is added, the lower one sinks. There is nothing, it appears, except long, sedgy grass, and a little soil, to prevent its sinking into the shades of eternal night. I have now done, sir, with Chat Moss, and there I leave the railway."

The Committee then divided on the preamble that a line between Manchester and Liverpool was necessary,

and it was carried by a majority of one—thirty-eight for, and thirty-seven against it. The first clause, empowering the company to make the railroad, was lost however by a majority of nineteen to thirteen, and Mr. Adam, on the part of the promoters, withdrew the bill.

The next session the bill was again presented, the line having been resurveyed by competent engineers. It passed the Committee, and the opposition of the House of Commons culminated on its third reading. The Hon. Edward Stanley (the present Earl of Derby) moved that the bill be read that day six months, on the ground that the railway trains would take ten hours on the journey, and could only be worked by horses. The motion was seconded by Sir Isaac Coffin, who was eloquent in his denunciations. "What, he should like to know, was to be done with all those who had advanced money in making and repairing turnpike roads? What was to become of the coach-makers and harness-makers, coach-masters and coachmen, innkeepers, horse breeders, and horse dealers? Was the House aware of the smoke and the noise, the hiss and the whirl, which locomotive engines, passing at the rate of ten or twelve miles an hour, would occasion? It would be the greatest nuisance, the most complete disturbance of quiet and comfort in all parts of the kingdom, that the ingenuity of man could invent!" The third reading passed by a majority of eighty-eight to forty-one, in a thin House; and to the credit of the House of Lords, it passed there almost unanimously, the Earl of Derby, and his relation the

Earl of Wilton, being the only dissentients. Thus, at a cost of £27,000 the parliamentary battle was successfully fought.

George Stephenson was appointed chief engineer of the proposed line. He employed three subordinates, each taking a part as his particular share. One of these assistants was Joseph Locke; another, William Allcard; and the third, John Dixon, who had the celebrated Chat Moss allotted to him. On his first venture to survey the bog he was nearly smothered in the soft pulpy mass, and it required all the persuasions of his friends to induce him to undertake the work of making a road firm enough for engine and train of a hundred tons weight. When the Moss was bridged over, however, the greatest of the difficulties in the construction of the line was surmounted. In the middle of the year 1829, three years after the bill passed, the tunnel at Liverpool was finished. It was the first novelty of the kind in connection with the railroad, and thousands of people visited it at one shilling a head, to see it lighted up with gas. In January, 1830, the first engine crossed over Chat Moss on a firm road, the most extraordinary part of the success being, that it was the cheapest part of the line. The estimated cost by a leading engineer had been £270,000, and the whole twelve miles was completed under Stephenson's direction at a cost of £28,000.

In the meantime the battle of the locomotives had been fought. Up to 1829, the engines at Killingworth were the best that had been invented. So far were they from

being adapted to quick and cheap transit, that it was still debated, three years after the railroad had been commenced, whether it was not advisable to employ horses exclusively on the line. But Stephenson persisted in his advocacy of the steam-engine, and at last the directors offered a prize of £500 for the best locomotive engine. There were eight conditions. 1. The engine was to consume its own smoke. 2. It must be able to draw a load of twenty tons, at the rate of ten miles an hour. 3. It was to have two safety valves, one entirely out of the reach of the engine-driver. 4. The whole engine must rest on six wheels, and be not more than fifteen feet in height. 5. It must not weigh more than six tons. 6. There must be a gauge to show when the steam pressure was more than forty-five pounds to the inch. 7. The engine must be delivered before the 1st of October, 1829; and 8th, and lastly, that it should not cost more than £550. The publication of these conditions excited plenty of ridicule. Many people declared that such an engine as the directors contemplated was impossible. The Government Inspector of steam-packets at Liverpool—he ought to have known better—said that only a parcel of charlatans would ever have issued such a set of conditions, and that, if ever they could make a locomotive engine go ten miles an hour, he would eat a stewed engine wheel to his breakfast! And now the two Stephensons—for Robert, the son, had just returned from his engagement in South America—set to work to improve the engine. The principal deficiency of the

first engines was the lack of sufficient steam-generating power in the boiler. Robert Stephenson had for his companion, on his return home, the first inventor of the engine, Richard Trevithic, and he had explained to his young friend some plans of his for boiler improvement by means of tubes. Then a clever son of William James, the first projector of the Liverpool and Manchester Railway, invented the tubular boiler, by the adoption of which, on condition of W. H. James receiving one-fourth of the profits, the Stephensons had been enabled to make a boiler with sufficient extension of its heating surface to get up steam rapidly and continuously, for the purpose of maintaining a high rate of speed. This was the principal improvement of the new engine, the "Rocket," which, when finished, was placed on the Killingworth Railway, and the boiler arrangement found to be perfectly successful. The engine was sent by waggon to Carlisle, and afterwards shipped to Liverpool.

As the day approached for the trial, the greatest interest and excitement prevailed throughout the country. Engineers and men interested in mechanics flocked into Liverpool from every direction. The competition was to take place at Rainhill, and four engines entered the list. No tournament of ancient days was so big with importance to national interests as the trial of engines at Liverpool on the 6th of October, 1829. A grand-stand was erected for the ladies; gentlemen came in on horseback or in carriages, and many thousands of spectators looked on. Science and art joined for the day with

beauty and fashion to witness the triumph of the locomotive. The "Rocket" was not first on the list. There were Timothy Hackworth's "Sanspareil," Erriccson's "Novelty," and Burstall's "Perseverance;" but when time was called George Stephenson was the only man ready.

Great disappointment was felt at this, for Erriccson's "Novelty" was the favourite. If the whole thing had not been so strange, there is no doubt that bets might have been taken in its favour at any odds. The fact is, its showy appearance stood in strange contrast with the unpretending character of the "Rocket." Upon being started, the latter engine ran twelve miles without interruption in about fifty-three minutes. The "Novelty" then went in, and apparently justified its backers, for it traversed the line, going at certain times at the rate of twenty-four miles an hour. Then the "Sanspareil" was exhibited; but nothing particular was done with it on the first day. The "Perseverance" couldn't get on faster than six miles an hour, and was withdrawn from the contest.

The next day the blast of the "Novelty" gave way, and the boiler of the "Sanspareil" got out of order; and, to lessen the disappointment to the large concourse of people assembled, the "Rocket" was again brought out. It was attached to a coach containing thirty passengers, and ran along the line at the rate of twenty-four to thirty miles an hour. General attention now became completely engaged in the steam trial at Liverpool.

On the 8th of October, all the other engines having

failed, the "Rocket" was put on its final trial. The engine started with a load of thirteen tons weight in waggons behind it, and in some parts of the two miles of trial road it attained the velocity of twenty-nine miles an hour. It then made two trips without any weight attached, and reached a maximum speed of thirty-five miles in the hour. The result was utterly unexpected. The news of this extraordinary speed made itself heard even amongst the exciting political questions of the day. The "Rocket" was the forerunner of greater changes than those sought by the advocates of the Reform Bill. The success of the engine was complete. On a subsequent occasion, when carrying the news of the result of a contested election, it reached the enormous speed of sixty miles an hour. It was the first engine that crossed Chat Moss. It made Stephenson's fame culminate. And wondrous indeed were the consequences involved in its successful trial. Yet it was positively sold at little more than the price of old iron, in 1837, and was degraded to hauling coals from the pits to the town of Carlisle. After five years of this ignominious toil, it was laid up ingloriously, until the publication of Mr. Smiles' book called public attention to it, and now it is honourably placed by the side of "Puffing Billy," at the Patent Museum at South Kensington.

On the 14th of June, 1830, the first through trip was made on the new railway, and on the 15th of September the Duke of Wellington, Sir Robert Peel, and Mr. Huskisson, came down to witness the formal opening of the

line. Thousands of people assembled to see the eight engines and their respective trains carry the first load of passengers between Liverpool and Manchester. It was the commencement of the new era. But the times were troublous. The Iron Duke was no favourite, and when the trains reached Manchester, the mob had out-manœuvred the military, clambered about the carriages, and flung stones and brickbats at the carriage containing the duke. It is impossible to tell what effect this alarming innovation of quick locomotion had on the mind of the Conservative duke and his coadjutor, Sir Robert, but shortly after they retired in the face of the greatest political excitement perhaps ever known in England, and the year which witnessed the advent of railways was rendered memorable by the introduction of the Reform Bill.

In 1832 a bill was brought before Parliament to authorize the construction of the London and Birmingham Railway. The opposition to it on the part of the landed proprietors along the line was so great that seven-eighths of them were stated to be dissentients. Pamphlets were published bidding the public "beware of the bubbles;" and meetings were held in Exeter Hall to denounce the innovations. The consequence was that the bill was thrown out. Next year the directors returned to the charge, and it was the subject of general remark that the bill passed both Houses almost in silence, and with but the slightest opposition. It oozed out afterwards that half a million of money had been ex-

pended in conciliating the landowners along the route. The line was completed the whole length, and opened in 1838.

In the same year the Greenwich Railway was opened. When the first locomotive was put upon it, half-a-guinea was charged for the reserved seats to view it. When the passenger trains began to run a regular band of musicians was engaged to play in front of the station to attract customers. It was thought that the locomotive should have light along the road, lest it should get off the line during the night; consequently lamps were placed every eighty-eight yards along the whole way.

In 1839 part of the Eastern Counties was opened, with several small lines, connecting the Midland and Northern Counties. In 1840 the London and Southampton was opened, and also the North Midland, with its seven tunnels and two hundred bridges. In 1841 the Great Western, the Blackwall, and the Brighton railways were in full operation, and in the following year the Great Northern was opened at King's Cross. In fact, the railway enterprise had sprung into amazing proportions. It was estimated that in the sessions of 1836 and 1837 alone there were one hundred and fifty-one successful schemes for new railways, with a total of two thousand six hundred and eighty-eight miles, at the cost of £44,680,000.

Such is the early history of the railways. Before we make a comparison between coaching days and those of the railway express, it is due to the men who were instrumental

in bringing about the wondrous change, that we take a brief glance at their history and character.

RICHARD TREVITHIC was undoubtedly the inventor of the first locomotive. He was more than six feet high, well formed, and of great muscular strength. His manners were gentle and unassuming; his conversation remarkably instructive and agreeable, for he had the facility of expressing himself with singular perspicuity on any subject. His own perception was so clear that he was impatient at the want of it in others. "Why are you so dull?" he would bluntly say when he was not understood. He was plain in his dress; but his general deportment was so striking, that a passer-by would instantly recognize in him a distinguished man. He went through strange vicissitudes during his life. He made a little model of his steam-engine of 1802, which was exposed for sale as a cabinet curiosity in a shop in a street leading out of Fitzroy Square. This was purchased by Mr. Uvillé, a Peruvian, who had come to Europe, seeking for some mode to drain the silver mines. He found that the inventor was Trevithic, and he visited and stayed six months with him at Camborne, in Cornwall. A few years after, Trevithic went to South America, and arrived at Lima in 1817. His fame had gone before him, and Don Ricardo Trevithic was welcomed by the Viceroy in person, and a guard of honour appointed to wait upon him. He accumulated an immense fortune at the silver mines, and by his ingenious machinery so increased the yield of the precious metal, that the government were

contemplating a statue to his memory of massive silver, when the revolution broke out, and poor Don Ricardo lost every penny of his wondrous fortune, and returned to England, after being shipwrecked, with nothing but a pair of spurs to remind him of his American adventures. Trevithic tunnelled under the Thames, and nearly anticipated Brunel by thirty years; but some one happened, unfortunately, to hint that the work was not exactly straight, and this so annoyed him, that he attempted to prove the falsity of the remark by sinking a shaft. The water broke in, and the tunnel was swept away, just as he had reached within a hundred yards of its completion. He never succeeded in bettering his circumstances, although constantly engaged in perfecting and producing fresh inventions. His engines were in constant use throughout the West of England, and it was estimated that the saving accomplished by the use of his engines in Cornwall alone amounted to £100,000 per annum. In 1831 he made fresh inventions in the steam-engine, and finding a moneyed partner, went again into business; but he died two years after, prematurely, at the age of sixty-two. His life seems to have been, as far as his own circumstances were concerned, a series of brilliant failures. Yet, as has been observed by one writer, "he was the inventor of the high-pressure steam-engine, and of that boiler without which no steam-boat could have crossed the Atlantic, and has undoubtedly contributed more to the physical progress of mankind than any other individual of the present century."

William James was another instance of personal failure. He may be called the first advocate of railroads. He projected and surveyed years before the first railway came into existence. He realized the coming change in locomotion long in advance of his time. But he lost a large fortune in the prosecution of his schemes, and lived to see others reap the fruit of his labours.

The man who buttonholed everybody forty years ago on the subject of a "general iron railway" has gone to his rest. General, indeed, has now become the iron roads of England; and the descendants of Thomas Gray, of Nottingham, must surely be proud of their far-seeing ancestor, a bore who rode so magnificent a hobby.

Mr. Blackett, the proprietor of the Wylam Collieries, deserves a niche among the railway originators. At the beginning of the century he made the acquaintance of Trevithic in London, and in 1804 completed his first engine. In 1812 he made another, as little successful as the first, for that was the one which blew up Tommy Waters. Mr. Blackett still persisted, and his efforts were crowned with success, for shortly after his engineers completed "Puffing Billy," which continuously worked on the Wylam tramway, until a few years since. All honour to the enterprising coal-owner. His men declared his experiments "a perfect plague;" his friends laughed at him, and quoted the proverb, "a fool and his money;" but "Puffing Billy" stands at South Kensington, a monument of well-earned and successful enterprise.

The last and the greatest of the railway projectors and

inventors I shall have time to mention is GEORGE STEPHENSON. His history has been made familiar to all of us by the popular works of Mr. Smiles. His genius was the capability of taking infinite pains to accomplish what his mind was bent upon. He had keen powers of observation, considerable inventive faculty, and wonderful patience. Many can lay claim to having prepared the way for the railway enterprise, but of George Stephenson it may be emphatically said that he "fought the battle." "I have fought," said he, "for the locomotive single-handed for nearly twenty years, having no engineer to help me, until I had reared engineers under my own care. I put up with every rebuff, *determined* not to be put down." He was shrewd and intelligent on all subjects connected with his business. He didn't want to be told that floods rose high in a certain valley, for said he to his informant, "Tut, tut; don't I see the bridges?" He had a fine constitution—magnificent health; and these, added to the qualities of character just described, constituted certain elements of success. He was great and successful. "They used once," said he, "to call me Geordie Stephenson. I'm now called George Stephenson, Esq., of Tapton House, near Chesterfield." "He was diligent in business, and stood before kings." He lived to finish his work, and when he died, in 1848, London, Liverpool and Newcastle erected statues to the memory of the successful engineer.

In these days of extraordinary development we can scarcely realize what road improvement has accom-

plished for us. When Blind Jack of Knaresborough, a century ago, was making his first roads, and James Brindley was constructing the Bridgewater Canal, England had not a tithe of its present manufactures and commerce. The population was not one-half as large as it is in 1864; yet, although people were much more heavily taxed, the revenue was not more than one-fourth of its present amount. Even in 1801, when roads and canals had changed the aspect of the country, the taxes, which then amounted to three pounds seven shillings per head of the population, produced only £35,000,000 in the year; whilst in 1862 with a taxation of only two pounds thirteen shillings per head, the revenue was considerably upwards of £60,000,000 per annum.

I commenced these lectures on roads and road makers by asserting that a high civilization was only possible with good roads and speedy transit. As Lord Bacon said, centuries ago, "There be three things which make a nation great and prosperous; a fertile soil, busy workshops, and easy conveyance of men and things from one place to another." Had the great English sage lived in these days, he would, I think, have put the easy conveyance as the first requisite. Long after his time these three essentials to national prosperity were undeveloped. Macaulay tells us, that the food which appeared on a yeoman's table in 1685 would now raise a riot in a workhouse. Almost up to the present century, hundreds of things now

in common use were unknown. Our great grandfathers knew nothing of cheap publications, of carpets, of umbrellas, of congreve matches, of gas, of elastic articles of all descriptions. Political liberty was but partially understood. Religious intolerance was rampant. What little polite literature appeared was steeped in immorality. In tracing the history of road improvement, we find the cause of nineteenth century advancement. It seems strange to read that in 1763 the number of passengers conveyed by the coaches between London and Edinburgh did not exceed twenty-five monthly, and by all conveyances not more than fifty in the month. Good roads and canals brought up the number to 4,000 a month in 1835. Railways have increased the traffic yet fifty times more. The total number of passengers conveyed by the railways in Great Britain in 1862 was 180,485,727. It is in the memory of many of us, when not more than a dozen coaches per day was sufficient for the outside travel of this metropolis. The grand total of coaching traffic throughout the kingdom was comparatively very small. Thirty years have added to our travelling facilities 12,000 miles of railway, yielding a revenue of £30,000,000. The country has always been wealthy and prosperous in proportion to its roads. The vast development of our resources in this railway age presents as vivid a contrast to the tardy growth of national prosperity in the last century, as does the iron, canal, and macadamized roads to the boggy and dangerous lanes through which our ancestors floundered.

Blessings be on the heads of our road makers. Moral and intellectual improvement has followed in the wake of our splendid roads; and, to use the words of the late Sir Robert Peel, "they are not merely facilitating the transport of merchandise—they are not merely shortening the duration of journeys, or administering to the supply of physical wants; they are speeding the intercourse between mind and mind; they are creating new demands for knowledge; they are fertilizing the intellectual as well as the material waste, and they are removing the impediments which obscurity, or remoteness, or poverty, may have hitherto opposed to the emerging of real merit."